MODEL

GC-1005 Electronic Clock

HEATHKIT®

ASSEMBLY MANUAL

HEATH COMPANY · BENTON HARBOR, MICHIGAN

HEATHKIT®

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PRICE $2.00

I-595-1500

Dear Customer:

The Heathkit electronic product you have purchased is one of the best performing electronic products in the world.

Here's how we aim to keep it that way:

Your Heathkit Warranty

During your first 90 days of ownership, any parts which we find are defective, either in materials or workmanship, will be replaced or repaired free of charge. And we'll pay shipping charges to get those parts to you — anywhere in the world.

If we determine a defective part has caused your Heathkit electronic product to need other repair, through no fault of yours, we will service it free — at the factory, at any retail Heathkit Electronic Center, or through any of our authorized overseas distributors.

This protection is exclusively yours as the original purchaser. Naturally, it doesn't cover damage by use of acid-core solder, incorrect assembly, misuse, fire, flood or acts of God. But, it does insure the performance of your Heathkit electronic product anywhere in the world — for most any other reason.

After-Warranty Service

What happens after warranty? We won't let you down. If your Heathkit electronic product needs repairs or you need a part, just write or call the factory, your nearest retail Heathkit Electronic Center, or any Heath authorized overseas distributor. We maintain an inventory of replacement parts for each Heathkit model at most locations — even for many models that no longer appear in our current product line-up. Repair service and technical consultation are available through all locations.

We hope you'll never need our repair or replacement services, but it's nice to know you're protected anyway — and that cheerful help is nearby.

Sincerely,

HEATH COMPANY
Benton Harbor, Michigan 49022

HEATH
Schlumberger

HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022
PHONE 616-983-3961 TWX 616-983-3897

October 19, 1972

Dear Customer:

The manufacturer can no longer supply the IC socket called for in your Manual. Therefore, please make the following changes in your Manual before you start to assemble your Clock.

Page 3 – Right column, under "Hardware,"

Change:	C8	252-3	2	6-32 nut
To:	C8	252-3	3	6-32 nut
Change:	C10	254-1	3	#6 lockwasher
To:	C10	254-1	5	#6 lockwasher

– Under "Miscellaneous,"

Delete:	E11	434-221	1	IC socket
Add:		205-141	2	Tool plate
Add:		250-89	1	6-32 x 3/8" screw
Add:		432-144	24	Integrated circuit (IC) connector

Page 9 – Tape the new Page 9, supplied with this letter, over Page 9 in your Manual.

Page 10 – Tape the new Page 10, supplied with this letter, over Page 10 in your Manual.

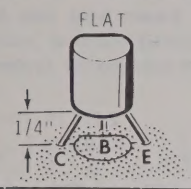
Thank you,

HEATH COMPANY

HEATHKIT

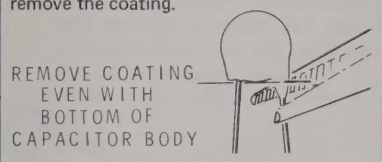
START

( ) Six MPS-L51 transistors (#417-295). As you install each transistor, solder the leads to the foil and cut off the excess lead lengths.



( ) Six MPS-A20 transistors (#417-801).

NOTE: When you install disc, mica, or Mylar capacitors, remove any excess coating from the leads. Use long-nose pliers to remove the coating.



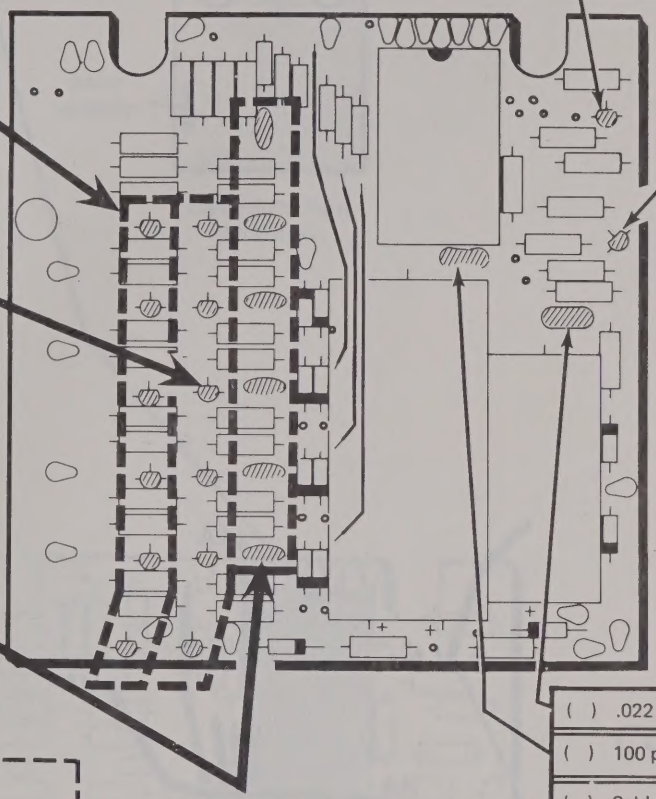
( ) Six .001 μF disc capacitors.

( ) Solder the leads to the foil and cut off the excess lead lengths.

CONTINUE

( ) MPS-A20 transistor (#417-801) at Q214.

( ) MPS-A20 transistor (#417-801) at Q213.



( ) .022 μF Mylar.

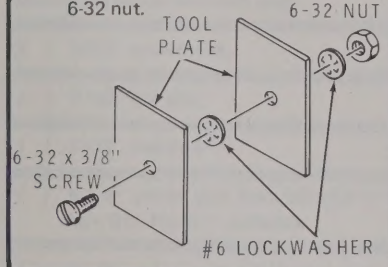
( ) 100 pF mica.

( ) Solder the leads to the foil and cut off the excess lead lengths.

PICTORIAL 2-3

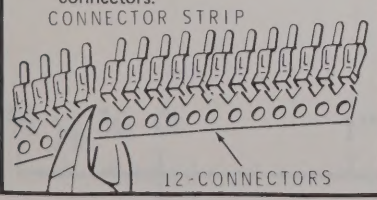
START

( ) Assemble the two tool plates together as shown. Use a 6-32 x 3/8" screw, two #6 lockwashers, and a 6-32 nut.



( ) NOTE: In the following steps you will prepare and install the IC connectors. Read and follow the instructions very closely.

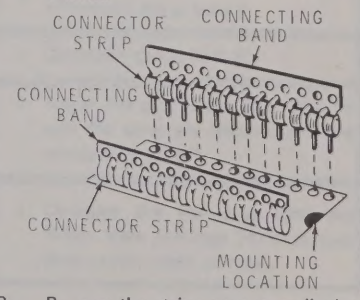
( ) Cut two (2) strips to twelve (12) IC connectors.



CONTINUE

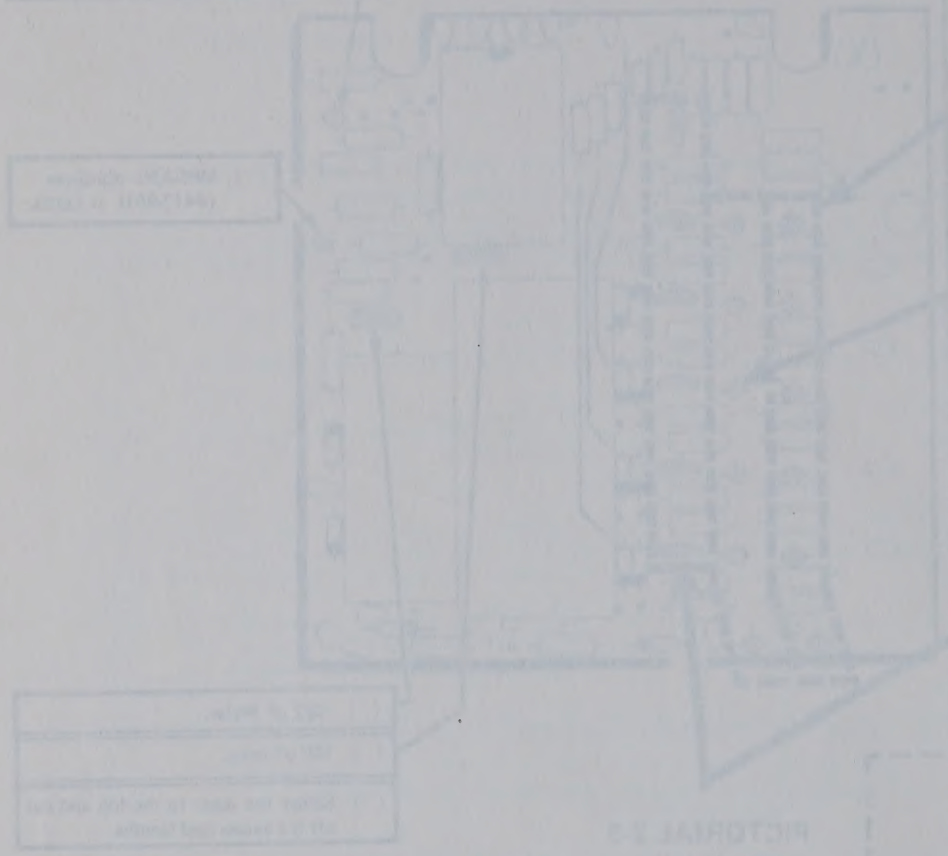
IMPORTANT: On the next page, use the following method to install the two IC connector strips.

A. Position the connector strips as shown.



B. Be sure the strips are perpendicular to the circuit board. Then turn the board over and solder the connectors to the foil.

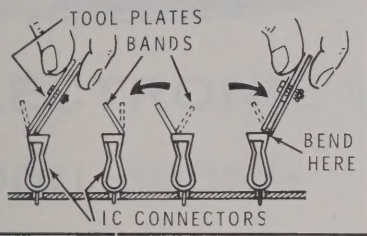
PICTORIAL 2-3A



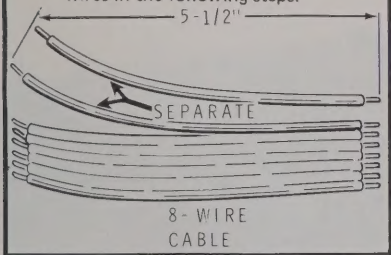
START

( ) Two strips of twelve connectors.

( ) Use the assembled tool plates to remove the connecting bands. First bend each band inward, and then outward, as shown (several times if necessary). Do not bend the connectors.



( ) Cut a 5-1/2" length of 8-wire cable and separate the cable into eight individual wires. You will use these wires in the following steps.



NOTE: In the following steps, when a wire is called for, cut the wire to the indicated length, remove 1/4" of insulation from the wire ends, twist the strands together, and apply a small amount of solder to the bare ends. Solder each wire as it is installed and cut off the excess bare wire ends.

( ) 2-5/8" brown wire.

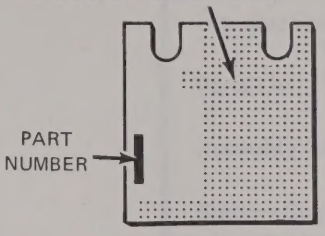
( ) 2-3/8" red wire.

( ) 2-7/8" orange wire.

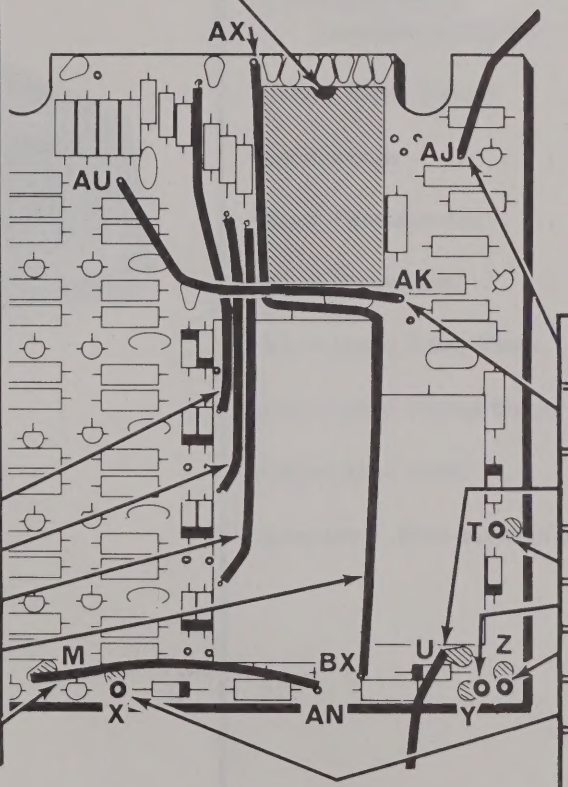
( ) 5-1/4" yellow wire from hole AX to hole BX. Route it as shown.

( ) 2-1/2" red wire from hole M to hole AN.

The steps performed in this Pictorial are in this area of the circuit board.



IDENTIFICATION DRAWING



PICTORIAL 2-4

CONTINUE

( ) 3" gray wire at hole AJ. The free end will be connected later.

( ) 3" green wire from hole AU to hole AK.

( ) 5" violet wire at hole U. The free end will be connected later.

( ) Connector pin at hole T.

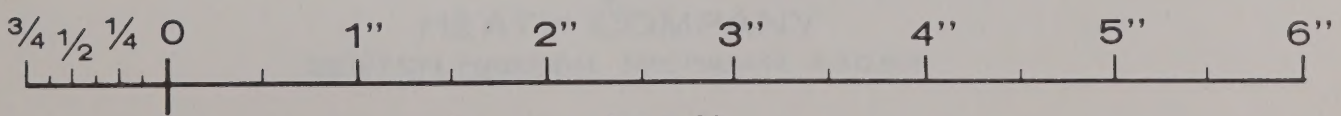
( ) Connector pin at hole Y.

( ) Connector pin at hole Z.

( ) Connector pin at hole X.

( ) Solder the pins to the foil. Also, be sure the wires are soldered and the excess ends cut off.

( ) Compare the foil area with the X-Ray View (on Page 29) to be sure there are no solder bridges.



Assembly and Operation of the

HEATHKIT®

ELECTRONIC CLOCK

MODEL GC-1005

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HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022

INTRODUCTION

The Heathkit Model GC-1005 digital Electronic Clock has many attractive features, including: a wiring option that lets it display either 12-hour or 24-hour time; an AM-PM alarm with snooze alarm; a 6-digit, easy-to-read display; a power interruption indication; a 50 or 60 Hz wiring option; and a 120-volt or 240-volt wiring option. The heart of the Clock is an MOS/LSI* integrated circuit that performs all the logic functions of keeping time.

A simple wiring option lets your Clock display either 12-hour or 24-hour time. The clock "knows" the difference between AM and PM and will only sound the alarm for the one time (either AM or PM, but not both) in 24 hours that you desire. The snooze alarm waits approximately seven minutes each time it is reset, until it sounds again.

*MOS/LSI (Metal Oxide Semiconductor/Large Scale Integration)

The readout tubes clearly display the time on a sloped surface, and the 6-digit display shows all 8's if there is a significant power line interruption. The Clock can be wired to operate from either a 50 Hz or a 60 Hz power line, or 120 volts or 240 volts AC.

Attractive, modern styling; small size; and solid-state dependability make this Clock ideally suited for your office, your home, or almost anywhere.

Refer to the "Kit Builders Guide" for complete information on unpacking, parts identification, tools, wiring, soldering, and step-by-step assembly procedures.

PARTS LIST

Check each part against the following list. The key numbers correspond to the numbers in the Parts Pictorial (fold-out from Page 5). Any part that is packaged in an individual envelope with the part number on it should be placed back in the envelope after it is identified until it is called for in a step.

CAUTION: The integrated circuit (#443-601) can be damaged by static voltage. Do not handle it until you are told to do so.

To order replacement parts: Use the Parts Order Form furnished with this kit. If one is not available, see "Replacement Parts" in the "Kit Builders Guide."

RESISTORS

NOTE: Each of the following resistors has a 10% tolerance unless otherwise noted. 10% is indicated by a silver fourth color band, while 5% is indicated by a gold band.

1/4-Watt

KEY No.	PART No.	PARTS Per Kit	DESCRIPTION	PRICE Each
A1	1-46-12	14	27 kΩ (red-violet-orange)	.10
A1	1-12-12	1	82 kΩ (gray-red-orange)	.10
A1	1-90-12	2	91 kΩ, 5% (white-brown-orange)	.10
A1	1-32-12	4	100 kΩ (brown-black-yellow)	.10
A1	1-16-12	7	180 kΩ (brown-gray-yellow)	.10

1/2-Watt

KEY No.	PART No.	PARTS Per Kit	DESCRIPTION	PRICE Each
A2	1-45	1	220 Ω (red-red-brown)	.10
A2	1-13	1	2700 Ω (red-violet-red)	.10
A2	1-114	3	8200 Ω, 5% (gray-red-red)	.20
A2	1-109	3	12 kΩ, 5% (brown-red-orange)	.20
A2	1-22	4	22 kΩ (red-red-orange)	.10
A2	1-47	2	56 kΩ (green-blue-orange)	.10
A2	1-102	1	82 kΩ (gray-red-orange)	.10
A2	1-121	13	120 kΩ (brown-red-yellow)	.10

KEY No.	PART No.	PARTS Per Kit	DESCRIPTION	PRICE Each
Resistors (cont'd.)				
A2	1-30	6	270 kΩ (red-violet-yellow)	.10
A2	1-33	6	470 kΩ (yellow-violet-yellow)	.10
A2	1-35	6	1 MΩ (brown-black-green)	.10
CAPACITORS				
A3	20-102	1	100 pF mica	.20
A4	21-163	6	.001 μF disc	.10
A5	27-63	1	.022 μF Mylar*	.10
A6	25-30	1	Dual 20 μF electrolytic	1.00
A7	25-241	1	1200 μF electrolytic	.90
DIODES				
B1	56-25	1	1N4166A zener	1.00
B1	56-56	8	1N4149	.20
B1	57-27	1	1N2071	.50
B1	57-65	2	1N4002	.20
TRANSISTORS-INTEGRATED CIRCUIT				

NOTE: Transistors and integrated circuits are marked for identification in one of the following four ways:

1. Part number.
2. Type number. (In integrated circuits this refers only to the numbers; the letters may vary.)
3. Part number and type number.
4. Part number with a type number other than the one listed.

B2	417-811	7	MPS-L01 transistor	.40
B2	417-295	6	MPS-L51 transistor	.50
B2	417-801	8	MPS-A20 transistor	.20
B3	443-601	1	MK5017AA integrated circuit	15.00
SWITCHES-INSULATORS				
B4	60-1	1	SPST switch	.20
	60-6	3	SPST switch with spring return	.30
B5	60-49	2	DPDT switch	.30
B6	75-52	6	Switch insulator	.10
B7	75-103	1	Fish paper	.10
B8	75-138	4	Rubber foot	.10

*DuPont Registered Trademark

KEY No.	PART No.	PARTS Per Kit	DESCRIPTION	PRICE Each
CORD-WIRE-CABLE				
	89-44	1	Line cord	.55
	340-11	1	Bare wire (used only for soldering iron tip)	.05/ft
	347-55	1	8-wire cable	.25/ft
HARDWARE				
C1	250-420	7	2-32 x 1/4" self-tapping screw	.05
C2	250-52	3	4-40 x 1/4" screw	.05
C3	252-2	3	4-40 nut	.05
C4	254-9	3	#4 lockwasher	.05
C5	250-276	12	6-32 x 3/8" flat head screw	.05
C6	250-538	2	6-32 x 3/8" screw	.05
C7	250-1156	4	6-20 x 2-1/4" self-tapping screw	.10
C8	252-3	2	6-32 nut	.05
C9	253-60	2	#6 flat washer	.05
C10	254-1	3	#6 lockwasher	.05
CIRCUIT BOARDS-CABINET-LABELS				
	85-1239-2	1	Main circuit board	1.65
	85-1240-2	1	Display circuit board	.85
D1	92-77	1	Cabinet top	1.20
D2	92-78	1	Cabinet bottom	1.10
D3	390-341	1	Heathkit label	.10
	390-362	1	Fuse label	.10
	390-926	1	Cord disconnect label	.15
	390-995	1	Wood-grain trim	.40
	391-34	1	Blue and white label	
MISCELLANEOUS				
	54-820	1	Power transformer	4.60
E1	204-1876	2	Angle bracket	.15
E2	258-167	2	Speaker clamp	.05
E3	346-6	1	Sleeving	.05
E4	401-163	1	Speaker	1.40
E5	411-286	3	Display tube	5.00
E6	412-11	1	Neon lamp	.20
E7	421-40	1	3/16-ampere slow-blow fuse	.40
E8	431-43	1	Terminal strip	.10
E9	432-134	56	Connector pin	.10
E10	432-199	1	Wire nut	.10
E11	434-221	1	IC socket	.90

KEY No.	PART No.	PARTS Per Kit	DESCRIPTION	PRICE Each
Miscellaneous (cont'd.)				
E12	446-609	1	Window	1.20
	490-5	1	Nut starter	.10
	597-260	1	Parts Order Form	
	597-308	1	Kit Builders Guide	
			Manual (See front cover for part number.)	2.00
			Solder (Additional 6' rolls of solder, #331-13, can be ordered for 25 cents each.)	

The prices apply only on purchases from the Heath Company where shipment is to a U.S.A. destination. Add 10% (minimum 25 cents) to the price when ordering from a Heathkit Electronic Center to cover local sales tax, postage, and handling. Outside the U.S.A., parts and service are available from your local Heathkit source and will reflect additional transportation, taxes, duties, and rates of exchange.

ASSEMBLY NOTES

1. Before you start to assemble this kit, read the wiring, soldering, and step-by-step assembly information in the "Kit Builders Guide."

2. Due to the small foil area around the circuit board holes and the small areas between foils, it will be necessary to use the utmost care to prevent solder bridges between adjacent foil areas. Use only a minimum amount of solder and use no larger than a 25-watt soldering iron with a small tip. Allow it to reach operating temperature, and then apply it only long enough to make a good solder connection.

3. If a small wattage, small-tip soldering iron is not available, proceed as follows: Be sure your soldering iron is cool. Wrap the large bare wire (supplied) tightly around the soldering iron tip as shown in Figure 1. Allow approximately 1/4" of wire to extend beyond the end of the soldering iron. Cut the wire end to a chisel shape as shown. Occasionally apply solder to the turns of large bare wire to achieve a good heat transfer.

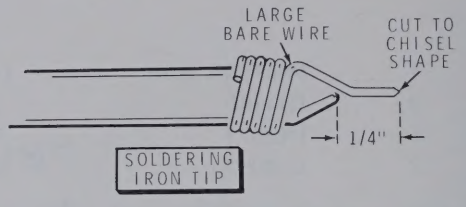


Figure 1

4. Resistors will be called out by their resistance value in Ω, kΩ, or MΩ, and color code.

5. Capacitors will be called out by their capacitance value (in pF or μF) and type (disc, mica, Mylar, or electrolytic).

HEATHKIT®

STEP-BY-STEP ASSEMBLY

START

Position the display circuit board as shown in Pictorial 1-1. Then complete each step on the Pictorial.

NOTE: In the following steps, use 1/4-watt resistors (the smaller resistors) unless directed otherwise.

( ) 180 kΩ (brown-gray-yellow).

( ) 27 kΩ (red-violet-orange).

( ) 91 kΩ, 5% (white-brown-orange).

( ) 180 kΩ (brown-gray-yellow).

SAFETY WARNING: Avoid eye injury when you clip off excess leads. We suggest that you wear glasses, or at least clip the leads so the ends will not fly toward your eyes.

( ) Solder the leads to the foil and cut off the excess lead lengths. Save these excess lead lengths for the next four steps.

NOTE: In the following four steps, use cut off resistor leads as shown. Solder each lead as it is installed.

( ) 3/4" resistor lead at K. See the inset drawing.

( ) 3/4" resistor lead at L.

( ) 3/4" resistor lead at N.

( ) 3/4" resistor lead at P.

( ) Make sure the four previously installed wires are still down against the circuit board and did not move during soldering.

( ) 180 kΩ (brown-gray-yellow).

( ) 82 kΩ (gray-red-orange).

( ) 27 kΩ (red-violet-orange).

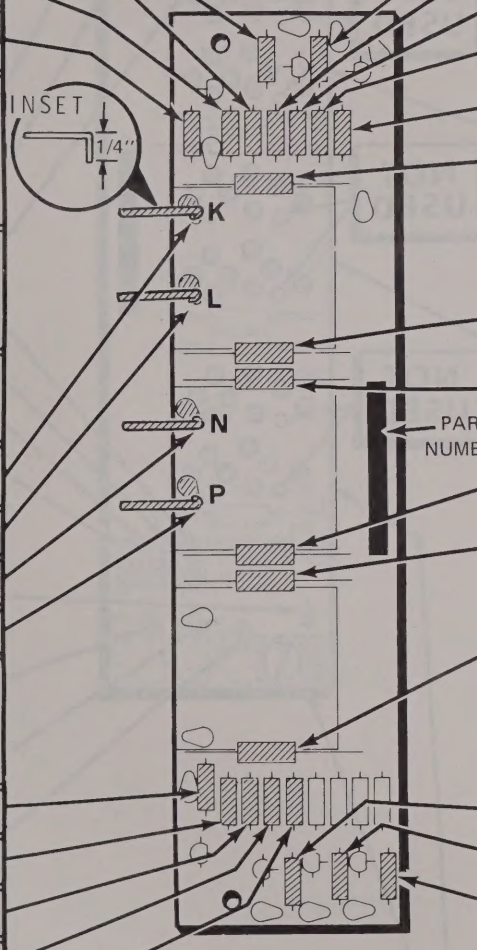
( ) 100 kΩ (brown-black-yellow).

( ) 27 kΩ (red-violet-orange).

( ) Solder the leads to the foil and cut off the excess lead lengths.

FOR GOOD SOLDERED CONNECTIONS, YOU MUST KEEP THE SOLDERING IRON TIP CLEAN...

WIPE IT OFTEN WITH A DAMP SPONGE OR CLOTH.



CONTINUE

( ) 180 kΩ (brown-gray-yellow).

( ) 27 kΩ (red-violet-orange).

( ) 91 kΩ, 5% (white-brown-orange).

( ) 27 kΩ (red-violet-orange).

( ) 100 kΩ (brown-black-yellow).

( ) 470 kΩ, 1/2-watt (yellow-violet-yellow).

( ) Solder the leads to the foil and cut off the excess lead lengths.

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( ) 470 kΩ, 1/2-watt (yellow-violet-yellow).

( ) 470 kΩ, 1/2-watt (yellow-violet-yellow). Be sure the leads of this resistor do not touch any other resistor leads.

( ) Solder the leads to the foil and cut off the excess lead lengths.

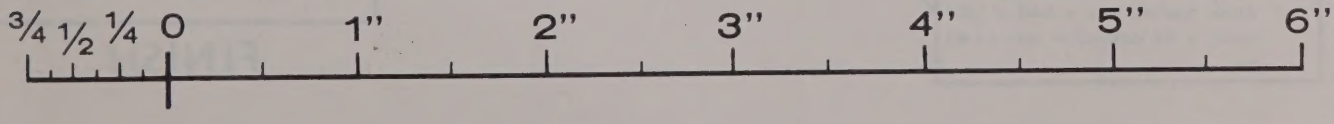
( ) 180 kΩ (brown-gray-yellow).

( ) 180 kΩ (brown-gray-yellow).

( ) 180 kΩ (brown-gray-yellow).

( ) Solder the leads to the foil and cut off the excess lead lengths.

PICTORIAL 1-1



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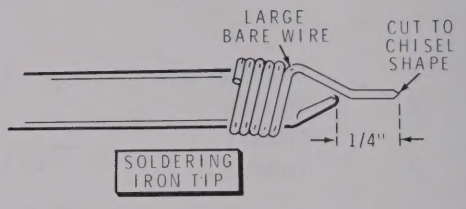


Figure 1

4. Resistors will be called out by their resistance value in Ω, kΩ, or MΩ, and color code.

5. Capacitors will be called out by their capacitance value (in pF or μF) and type (disc, mica, Mylar, or electrolytic).

STEP-BY-STEP ASSEMBLY

START

Position the display circuit board as shown in Pictorial 1-1. Then complete each step on the Pictorial.

NOTE: In the following steps, use 1/4-watt resistors (the smaller resistors) unless directed otherwise.

( ) 180 kΩ (brown-gray-yellow).

( ) 27 kΩ (red-violet-orange).

( ) 91 kΩ, 5% (white-brown-orange).

( ) 180 kΩ (brown-gray-yellow).

SAFETY WARNING: Avoid eye injury when you clip off excess leads. We suggest that you wear glasses, or at least clip the leads so the ends will not fly toward your eyes.

( ) Solder the leads to the foil and cut off the excess lead lengths. Save these excess lead lengths for the next four steps.

NOTE: In the following four steps, use cut off resistor leads as shown. Solder each lead as it is installed.

( ) 3/4" resistor lead at K. See the inset drawing.

( ) 3/4" resistor lead at L.

( ) 3/4" resistor lead at N.

( ) 3/4" resistor lead at P.

( ) Make sure the four previously installed wires are still down against the circuit board and did not move during soldering.

( ) 180 kΩ (brown-gray-yellow).

( ) 82 kΩ (gray-red-orange).

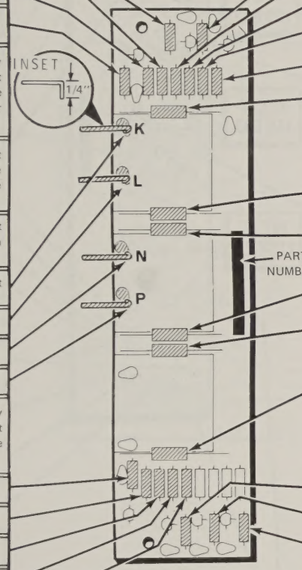
( ) 27 kΩ (red-violet-orange).

( ) 100 kΩ (brown-black-yellow).

( ) 27 kΩ (red-violet-orange).

( ) Solder the leads to the foil and cut off the excess lead lengths.

FOR GOOD SOLDERED CONNECTIONS, YOU MUST KEEP THE SOLDERING IRON TIP CLEAN.
WIPE IT OFTEN WITH A DAMP SPONGE OR CLOTH.



CONTINUE

( ) 180 kΩ (brown-gray-yellow).

( ) 27 kΩ (red-violet-orange).

( ) 91 kΩ, 5% (white-brown-orange).

( ) 27 kΩ (red-violet-orange).

( ) 100 kΩ (brown-black-yellow).

( ) 470 kΩ, 1/2-watt (yellow-violet-yellow).

( ) Solder the leads to the foil and cut off the excess lead lengths.

( ) 470 kΩ, 1/2-watt (yellow-violet-yellow).

( ) 470 kΩ, 1/2-watt (yellow-violet-yellow).

( ) 470 kΩ, 1/2-watt (yellow-violet-yellow).

( ) 470 kΩ, 1/2-watt (yellow-violet-yellow).

( ) 470 kΩ, 1/2-watt (yellow-violet-yellow). Be sure the leads of this resistor do not touch any other resistor leads.

( ) Solder the leads to the foil and cut off the excess lead lengths.

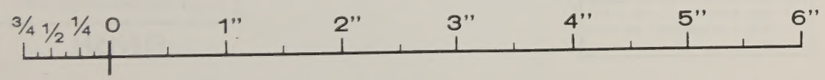
( ) 180 kΩ (brown-gray-yellow).

( ) 180 kΩ (brown-gray-yellow).

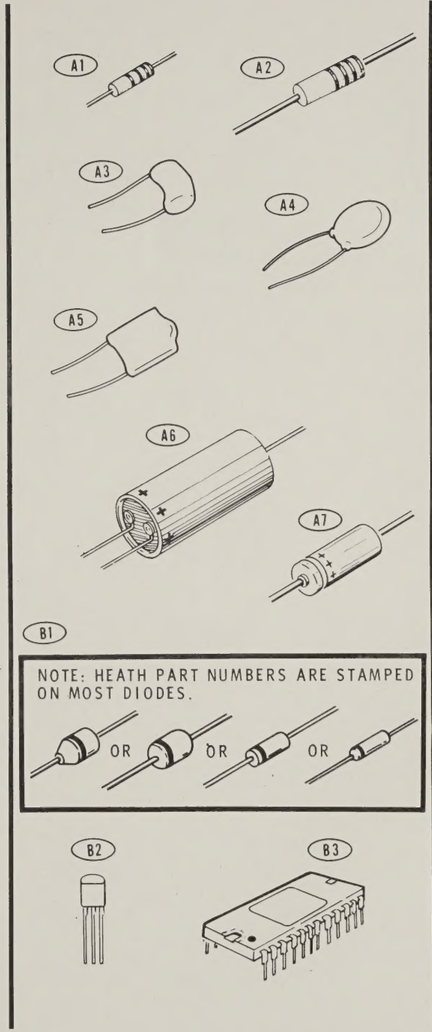
( ) 180 kΩ (brown-gray-yellow).

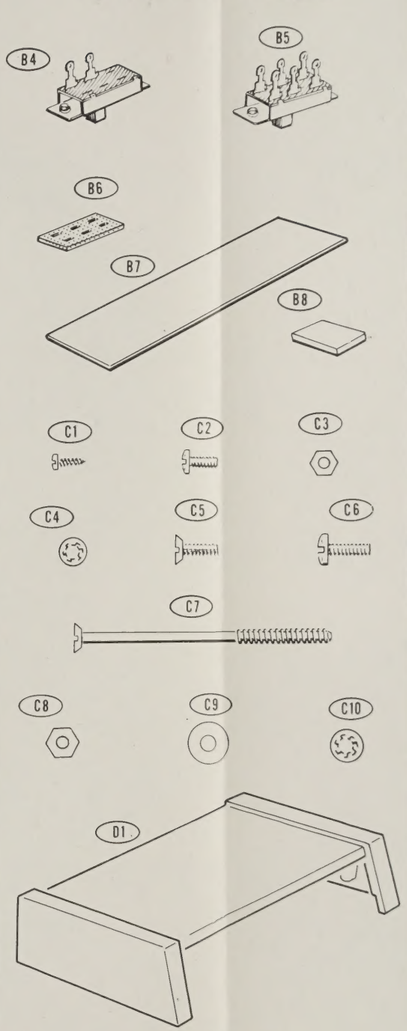
( ) Solder the leads to the foil and cut off the excess lead lengths.

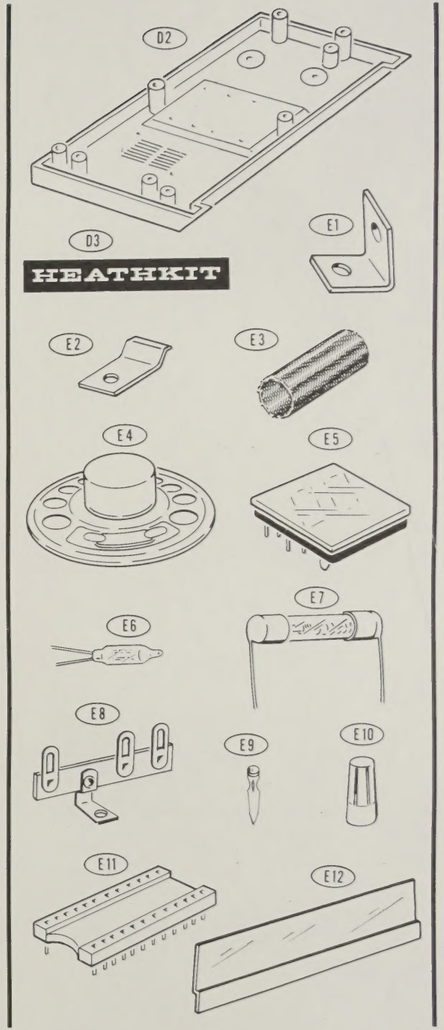
PICTORIAL 1-1

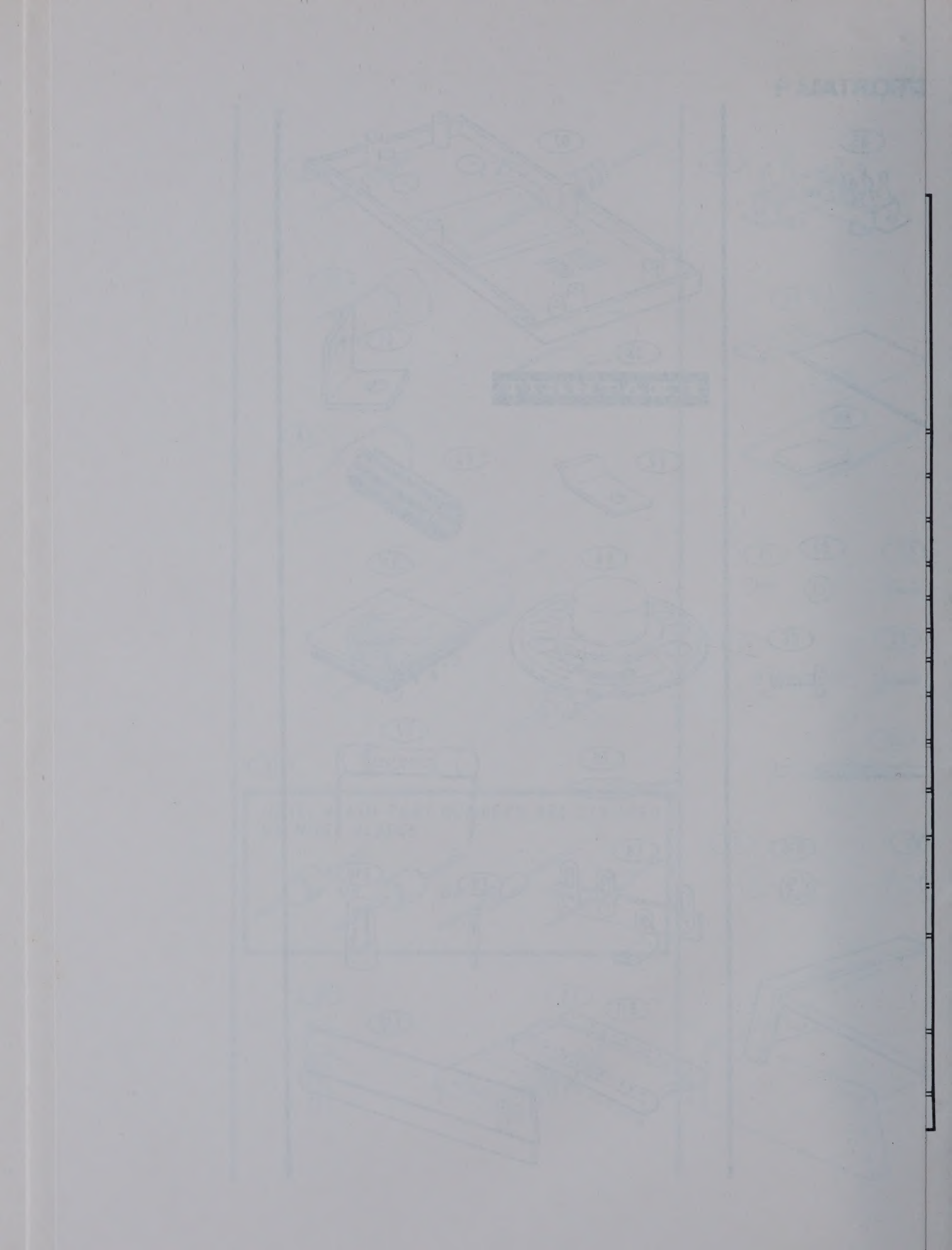


PARTS PICTORIAL

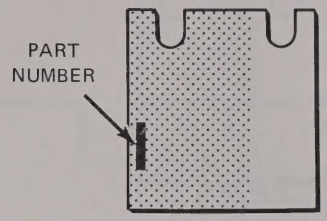








The steps performed in this Pictorial are in this area of the circuit board.



IDENTIFICATION DRAWING

START

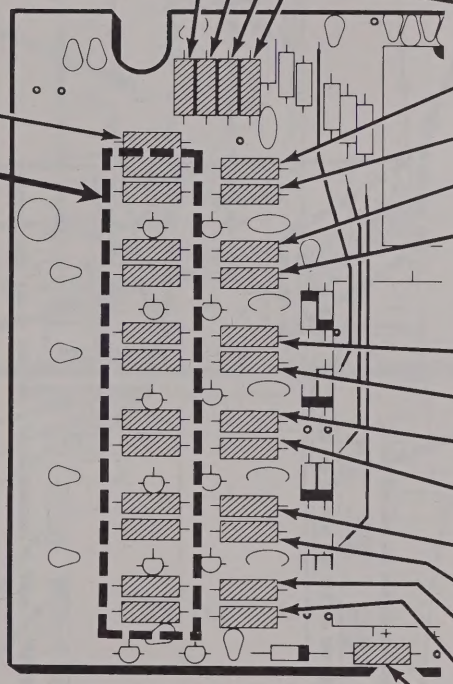
Position the main circuit board as shown in the identification drawing.

NOTE: In the following steps, use 1/2-watt resistors unless directed otherwise.

( ) 12 kΩ, 5% (brown-red-orange).

( ) Twelve 120 kΩ (brown-red-yellow) resistors.

( ) Solder the leads to the foil and cut off the excess lead lengths.



CONTINUE

( ) 22 kΩ (red-red-orange).

( ) 22 kΩ (red-red-orange).

( ) 22 kΩ (red-red-orange).

( ) 12 kΩ, 5% (brown-red-orange).

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) Solder the leads to the foil and cut off the excess lead lengths.

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) 2700 Ω (red-violet-red).

( ) Solder the leads to the foil and cut off the excess lead lengths.

PICTORIAL 2-1

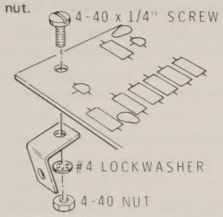
HEATHKIT®

START

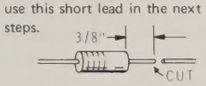
NOTES:

1. Use the plastic nut starter supplied with this kit to hold and start 6-32 and 4-40 nuts on screws.
2. You will install two angle brackets on this circuit board. Do not be concerned if the brackets touch nearby foils.

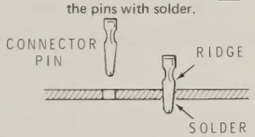
( ) Angle bracket. Use a 4-40 x 1/4" screw, a #4 lockwasher, and a 4-40 nut.



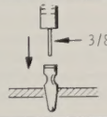
( ) Cut one lead of a 27 kΩ (red-violet-orange) resistor to 3/8". You will use this short lead in the next three steps.



1. Sixteen connector pins at V101. Solder the pins to the foil. Be sure the pins are straight and even. Do not fill the pins with solder.



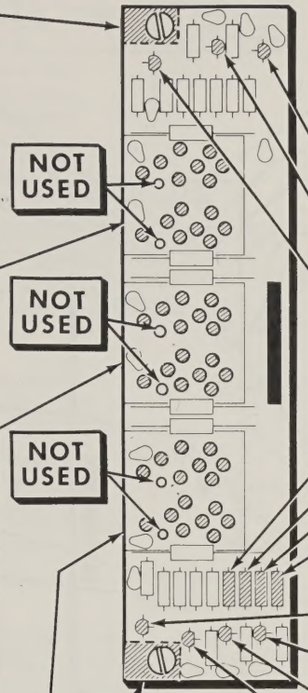
2. Push the 3/8" lead of the previously prepared resistor into each connector pin. This will open the connector pins slightly and make it easier to install the display tubes later.



( ) Sixteen connector pins at V102. Solder each pin to the foil and push the short lead into each pin.

( ) Sixteen connector pins at V103. Solder each pin to the foil and push the short lead into each pin.

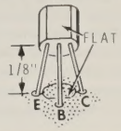
( ) Angle bracket. Use a 4-40 x 1/4" screw, a #4 lockwasher, and a 4-40 nut.



PICTORIAL 1-2

CONTINUE

NOTE: In each of the following steps where a transistor is installed, line up the flat on the transistor with the flat on the circuit board and insert the transistor leads into the corresponding E, B, and C holes in the circuit board. Solder each transistor as it is installed and cut off the excess lead lengths.



( ) MPS-L01 transistor (#417-811) at Q101.

( ) MPS-L01 transistor (#417-811) at Q102.

( ) MPS-L01 transistor (#417-811) at Q103.

( ) 100 kΩ (brown-black-yellow).

( ) 27 kΩ (red-violet-orange).

( ) 100 kΩ (brown-black-yellow).

( ) 27 kΩ (red-violet-orange).

( ) Solder the leads to the foil and cut off the excess lead lengths.

( ) MPS-L01 transistor (#417-811) at Q107.

( ) MPS-L01 transistor (#417-811) at Q104.

( ) MPS-L01 transistor (#417-811) at Q105.

( ) MPS-L01 transistor (#417-811) at Q106.

( ) Make sure all leads are soldered, and cut off any excess lead lengths. NOTE: Do not cut off the four leads that extend from the side of the circuit board.

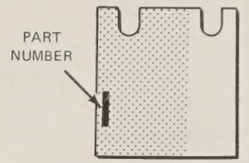
( ) Compare the foil area with the X-Ray View (on Page 28) to be sure there are no solder bridges.

Temporarily set the circuit board aside.

FINISH

HEATHKIT®

The steps performed in this Pictorial are in this area of the circuit board.



START

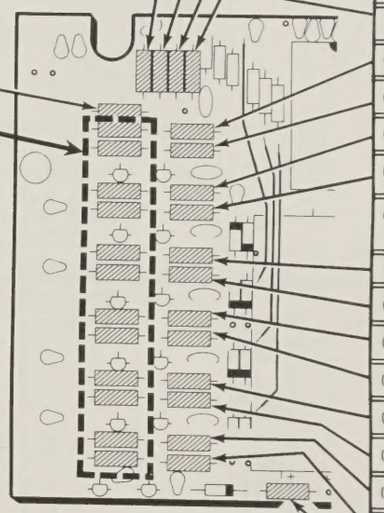
Position the main circuit board as shown in the identification drawing.

NOTE: In the following steps, use 1/2-watt resistors unless directed otherwise.

( ) 12 kΩ, 5% (brown-red-orange).

( ) Twelve 120 kΩ (brown-red-yellow) resistors.

( ) Solder the leads to the foil and cut off the excess lead lengths.



CONTINUE

( ) 22 kΩ (red-red-orange).

( ) 22 kΩ (red-red-orange).

( ) 22 kΩ (red-red-orange).

( ) 12 kΩ, 5% (brown-red-orange).

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) Solder the leads to the foil and cut off the excess lead lengths.

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) 2700 Ω (red-violet-red).

( ) Solder the leads to the foil and cut off the excess lead lengths.

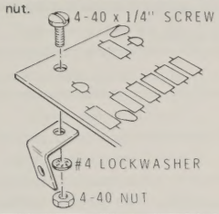
PICTORIAL 2-1

START

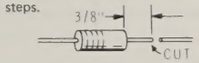
NOTES:

1. Use the plastic nut starter supplied with this kit to hold and start 6-32 and 4-40 nuts on screws.
2. You will install two angle brackets on this circuit board. Do not be concerned if the brackets touch nearby foils.

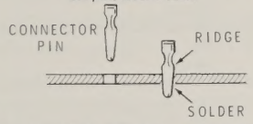
( ) Angle bracket. Use a 4-40 x 1/4" screw, a #4 lockwasher, and a 4-40 nut.



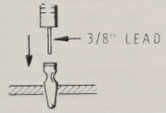
( ) Cut one lead of a 27 kΩ (red-violet-orange) resistor to 3/8". You will use this short lead in the next three steps.



1. Sixteen connector pins at V101. Solder the pins to the foil. Be sure the pins are straight and even. Do not fill the pins with solder.



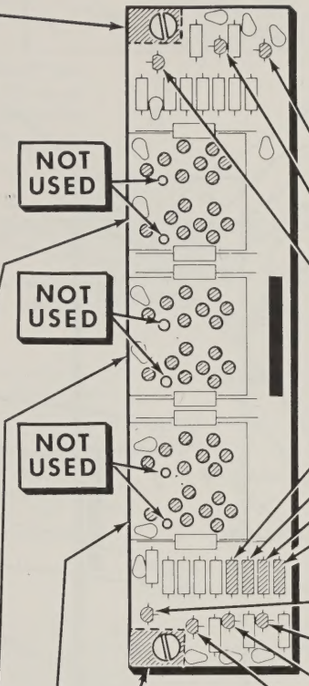
2. Push the 3/8" lead of the previously prepared resistor into each connector pin. This will open the connector pins slightly and make it easier to install the display tubes later.



( ) Sixteen connector pins at V102. Solder each pin to the foil and push the short lead into each pin.

( ) Sixteen connector pins at V103. Solder each pin to the foil and push the short lead into each pin.

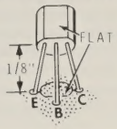
( ) Angle bracket. Use a 4-40 x 1/4" screw, a #4 lockwasher, and a 4-40 nut.



PICTORIAL 1-2

CONTINUE

NOTE: In each of the following steps where a transistor is installed, line up the flat on the transistor with the flat on the circuit board and insert the transistor leads into the corresponding E, B, and C holes in the circuit board. Solder each transistor as it is installed and cut off the excess lead lengths.



( ) MPS-L01 transistor (#417-811) at Q101.

( ) MPS-L01 transistor (#417-811) at Q102.

( ) MPS-L01 transistor (#417-811) at Q103.

( ) 100 kΩ (brown-black-yellow).

( ) 27 kΩ (red-violet-orange).

( ) 100 kΩ (brown-black-yellow).

( ) 27 kΩ (red-violet-orange).

( ) Solder the leads to the foil and cut off the excess lead lengths.

( ) MPS-L01 transistor (#417-811) at Q107.

( ) MPS-L01 transistor (#417-811) at Q104.

( ) MPS-L01 transistor (#417-811) at Q105.

( ) MPS-L01 transistor (#417-811) at Q106.

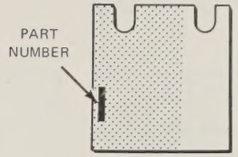
( ) Make sure all leads are soldered, and cut off any excess lead lengths. NOTE: Do not cut off the four leads that extend from the side of the circuit board.

( ) Compare the foil area with the X-Ray View (on Page 28) to be sure there are no solder bridges.

Temporarily set the circuit board aside.

FINISH

The steps performed in this Pictorial are in this area of the circuit board.



IDENTIFICATION DRAWING

START

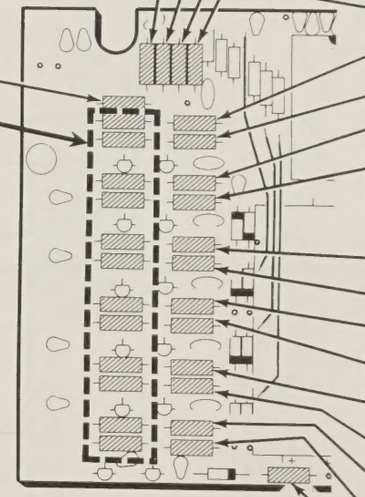
Position the main circuit board as shown in the identification drawing.

NOTE: In the following steps, use 1/2-watt resistors unless directed otherwise.

( ) 12 kΩ, 5% (brown-red-orange).

( ) Twelve 120 kΩ (brown-red-yellow) resistors.

( ) Solder the leads to the foil and cut off the excess lead lengths.



CONTINUE

( ) 22 kΩ (red-red-orange).

( ) 22 kΩ (red-red-orange).

( ) 22 kΩ (red-red-orange).

( ) 12 kΩ, 5% (brown-red-orange).

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) Solder the leads to the foil and cut off the excess lead lengths.

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) 1 MΩ (brown-black-green).

( ) 270 kΩ (red-violet-yellow).

( ) 1 MΩ (brown-black-green).

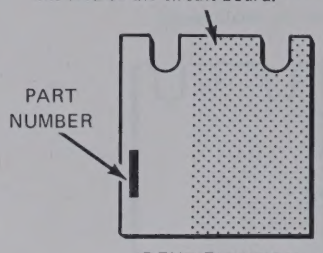
( ) 270 kΩ (red-violet-yellow).

( ) 2700 Ω (red-violet-red).

( ) Solder the leads to the foil and cut off the excess lead lengths.

PICTORIAL 2-1

The steps performed in this Pictorial are in this area of the circuit board.



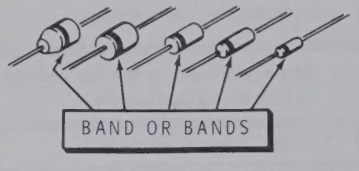
IDENTIFICATION DRAWING

START

( ) Six 27 kΩ, 1/4-watt (red-violet-orange) resistors.

( ) Solder the leads to the foil and cut off the excess lead lengths.

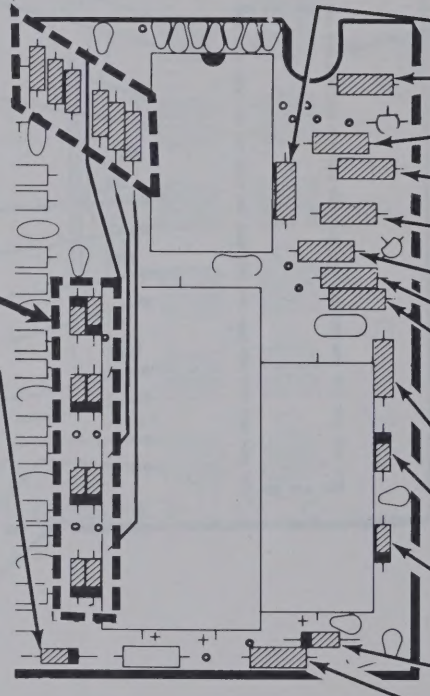
NOTE: DIODES MAY BE SUPPLIED IN ANY OF THE FOLLOWING SHAPES. ALWAYS POSITION THE BANDED END AS SHOWN ON THE CIRCUIT BOARD.



( ) Eight 1N4149 diodes (#56-56).

( ) 1N2071 diode (#57-27) at D201.

( ) Solder the leads to the foil and cut off the excess lead lengths.



CONTINUE

( ) 8200 Ω, 5% (gray-red-red).

( ) 22 kΩ (red-red-orange).

( ) 82 kΩ (gray-red-orange).

( ) 8200 Ω, 5% (gray-red-red).

( ) 56 kΩ (green-blue-orange).

( ) 120 kΩ, 5% (brown-red-yellow).

( ) 56 kΩ (green-blue-orange).

( ) 12 kΩ, 5% (brown-red-orange).

( ) Solder the leads to the foil and cut off the excess lead lengths.

( ) 8200 Ω, 5% (gray-red-red).

( ) 1N4002 diode (#57-65) at D203.

( ) 1N4002 diode (#57-65) at D202.

( ) 1N4166A zener diode (#56-25) at ZD201.

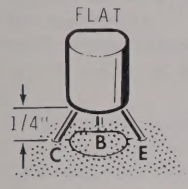
( ) 220 Ω (red-red-brown).

( ) Solder the leads to the foil and cut off the excess lead lengths.

PICTORIAL 2-2

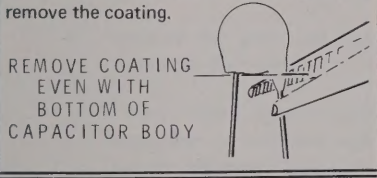
START

( ) Six MPS-L51 transistors (#417-295). As you install each transistor, solder the leads to the foil and cut off the excess lead lengths.



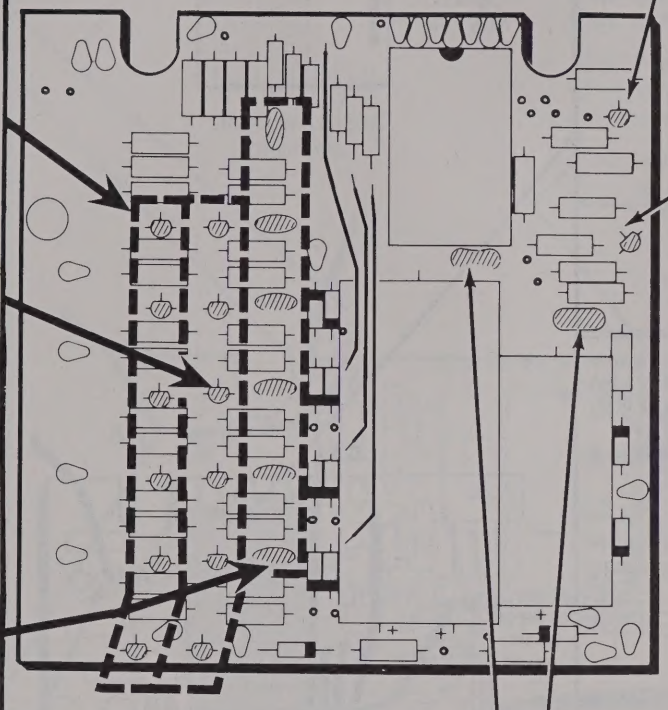
( ) Six MPS-A20 transistors (#417-801).

NOTE: When you install disc, mica, or Mylar capacitors, remove any excess coating from the leads. Use long-nose pliers to remove the coating.



( ) Six .001 µF disc capacitors.

( ) Solder the leads to the foil and cut off the excess lead lengths.



CONTINUE

( ) MPS-A20 transistor (#417-801) at Q214.

( ) MPS-A20 transistor (#417-801) at Q213.

( ) .022 µF Mylar.

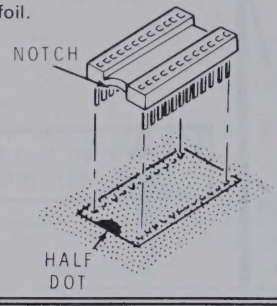
( ) 100 pF mica.

( ) Solder the leads to the foil and cut off the excess lead lengths.

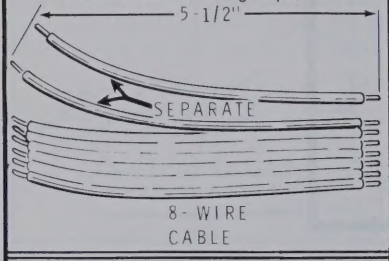
PICTORIAL 2-3

START

( ) IC socket. Be sure the leads are straight, position the notched end over the half dot on the circuit board, insert the leads into the holes, and solder the leads to the foil.



( ) Cut a 5-1/2" length of 8-wire cable and separate the cable into eight individual wires. You will use these wires in the following steps.



NOTE: In the following steps, when a wire is called for, cut the wire to the indicated length, remove 1/4" of insulation from the wire ends, twist the strands together, and apply a small amount of solder to the bare ends. Solder each wire as it is installed and cut off the excess bare wire ends.

( ) 2-5/8" brown wire.

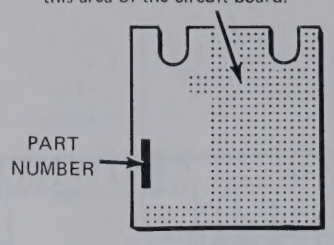
( ) 2-3/8" red wire.

( ) 2-7/8" orange wire.

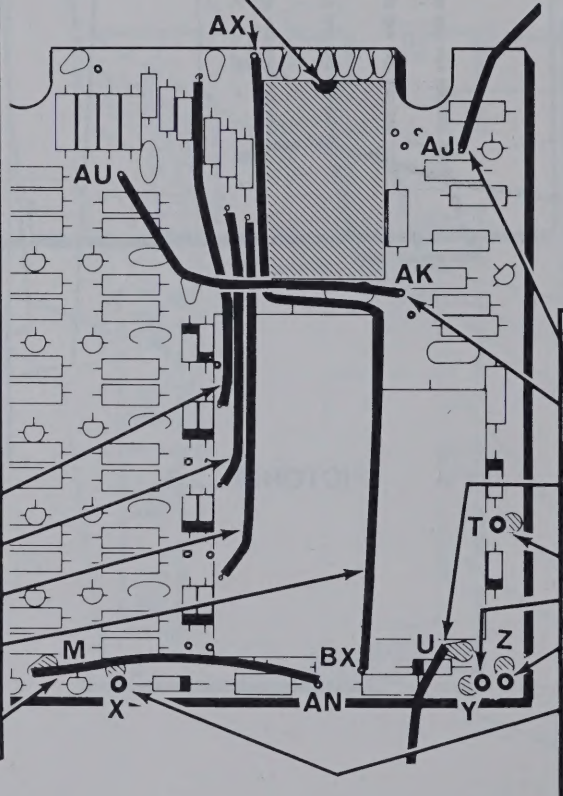
( ) 5-1/4" yellow wire from hole AX to hole BX. Route it as shown.

( ) 2-1/2" red wire from hole M to hole AN.

The steps performed in this Pictorial are in this area of the circuit board.



IDENTIFICATION DRAWING



PICTORIAL 2-4

CONTINUE

( ) 3" gray wire at hole AJ. The free end will be connected later.

( ) 3" green wire from hole AU to hole AK.

( ) 5" violet wire at hole U. The free end will be connected later.

( ) Connector pin at hole T.

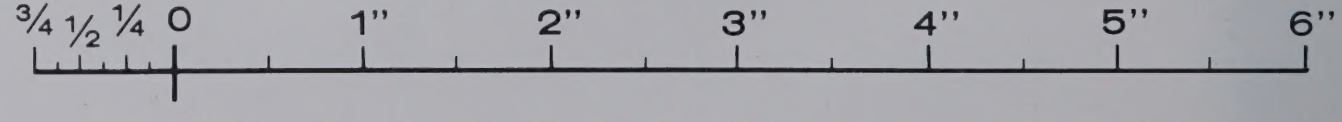
( ) Connector pin at hole Y.

( ) Connector pin at hole Z.

( ) Connector pin at hole X.

( ) Solder the pins to the foil. Also, be sure the wires are soldered and the excess ends cut off.

( ) Compare the foil area with the X-Ray View (on Page 29) to be sure there are no solder bridges.



START

( ) 2-1/4" green wire from hole AT to hole AR. Do not shorten this wire.

( ) 3" blue wire at hole J. The free end will be connected later.

( ) Cut a 10" length of 8-wire cable and:

1. Separate the brown and red wires from the cable, leaving the brown wire connected to the red wire.
2. Separate the orange wire from the cable.
3. Separate the yellow wire from the cable.
4. Separate the green and blue wires from the cable.

   Leave the green wire connected to the blue wire and the violet wire connected to the gray wire.

( ) 8" orange wire at hole AS. The free end will be connected later.

NOTE: The power line frequency in the U.S.A. is 60 Hz. Do not perform the following step unless you live in an area (or a foreign country) that has a 50 Hz power line frequency.

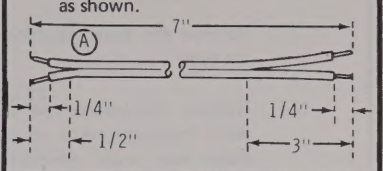
( ) 3" yellow wire from hole BY to hole BZ.

NOTE: Most clocks indicate up to 12 hours (0-12) and then repeat. Do not perform the following step unless you want your Clock to indicate 24-hour time (0-24).

( ) 3-1/4" yellow wire from hole AY to hole AZ.

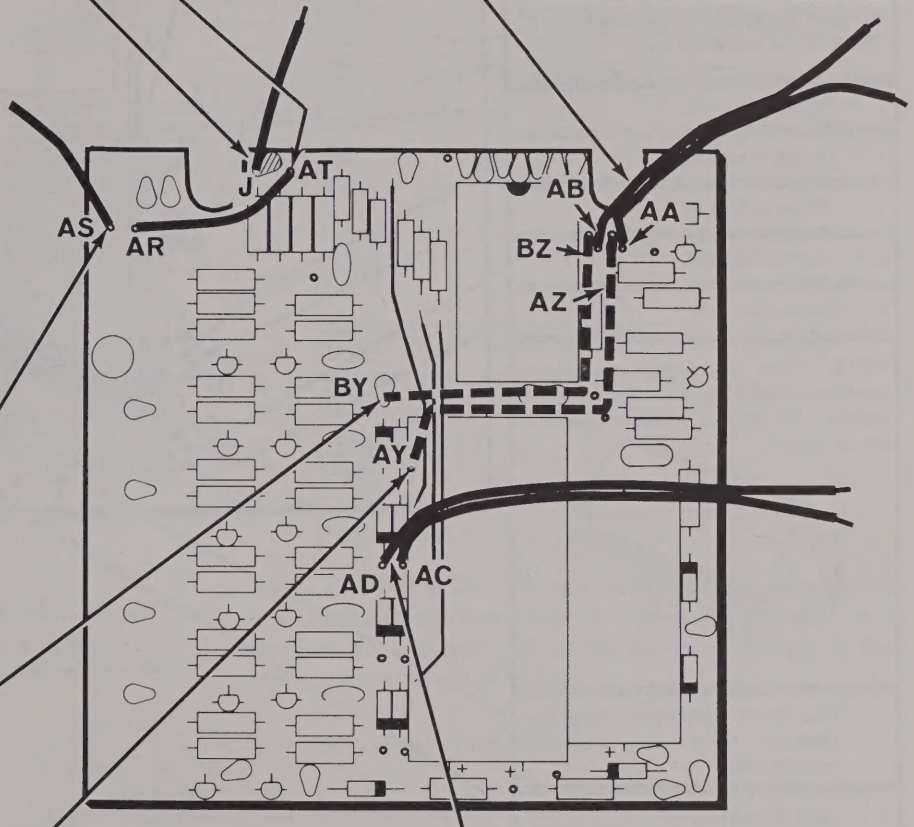
CONTINUE

( ) Prepare the gray and violet wire pair as shown.



( ) Install end A of the wire combination as shown.

Violet wire to hole AB.
Gray wire to hole AA.



( ) Cut the green and blue wire pair to a length of 9-1/2" and prepare the ends the same as the previous pair.

( ) Install the wire combination as shown.

Blue wire to hole AD.
Green wire to hole AC.

( ) Check to be sure all wires are soldered.

PICTORIAL 2-5

HEATHKIT®

START

( ) Cut a 9-1/2" length of 8-wire cable and:

1. Remove the gray wire from the cable.
2. Remove the brown and red wires from the cable. (Leave these two wires connected together.)

( ) Prepare the remaining wires of the cable as shown in Detail 2-6A.

In the following steps, connect the wires of end A of the cable to the circuit board. End B will be connected later.

( ) Violet to hole AL.

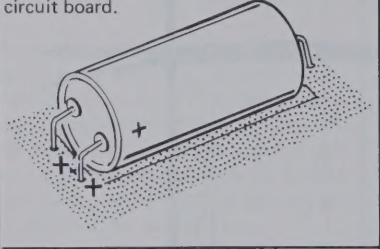
( ) Orange to hole AE.

( ) Yellow to hole AF.

( ) Green to hole AH.

( ) Blue to hole AG.

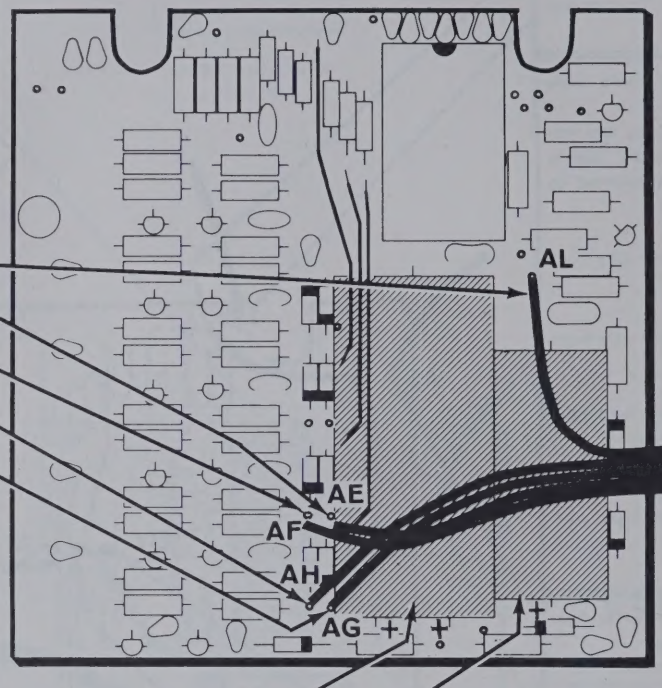
NOTE: When you install electrolytic capacitors, match the positive (+) marked end with the positive (+) marking on the circuit board.



( ) Dual 20 μF electrolytic. Install the capacitor under the previously installed cable.

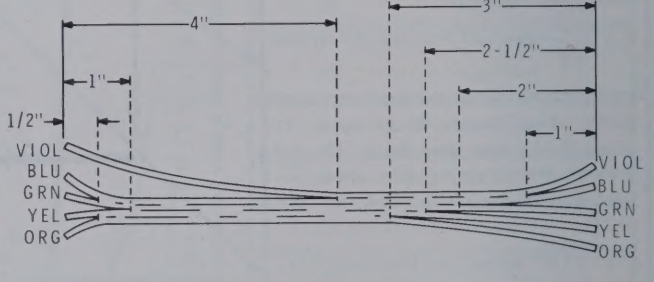
( ) 1200 μF electrolytic.

( ) Solder the leads to the foil and cut off the excess lead lengths.

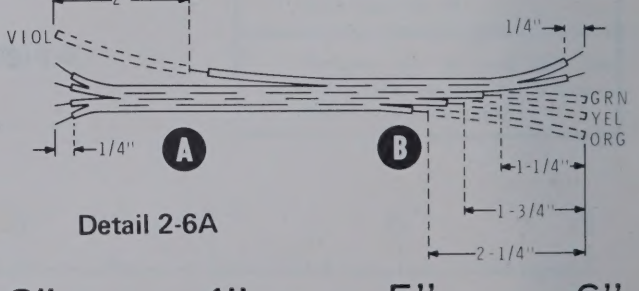


PICTORIAL 2-6

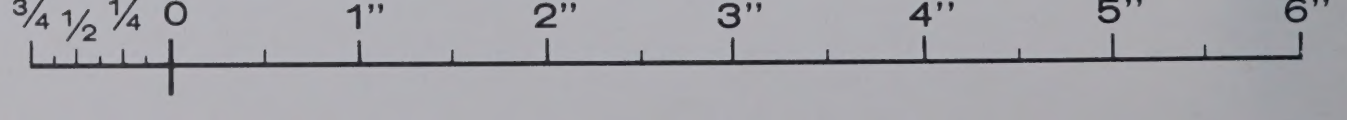
SEPARATE THE WIRES AS SHOWN.

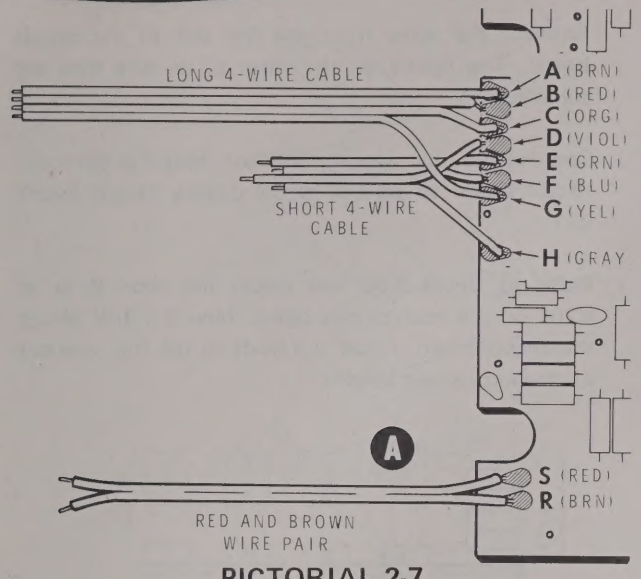


CUT THE WIRES AS SHOWN AND REMOVE 1/4" OF INSULATION FROM EACH WIRE END.



Detail 2-6A



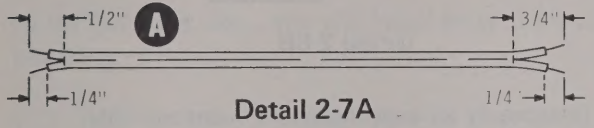


PICTORIAL 2-7

Refer to Pictorial 2-7 for the following steps.

( ) Locate a red and brown wire pair and cut the pair to 6".

RED AND BROWN WIRE PAIR



Detail 2-7A

( ) Refer to Detail 2-7A and prepare the wire ends as shown.

Refer to Pictorial 2-7 and connect end A of the red and brown wire pair to the main circuit board as follows:

( ) Brown wire to hole R (S-1).

( ) Red wire to hole S (S-1).

( ) Cut a 9-1/2" length of 8-wire cable.

( ) Refer to Detail 2-7B, separate the 8-wire cable into two 4-wire cables, and prepare the cables as shown.

Refer to Pictorial 2-7 and connect end A of the short 4-wire cable to the main circuit board as follows:

( ) Gray wire to hole H (S-1).

( ) Blue wire to hole F (S-1).

( ) Green wire to hole E (S-1).

( ) Violet wire to hole D (S-1).

Connect end A of the long 4-wire cable as follows:

( ) Yellow wire to hole G (S-1).

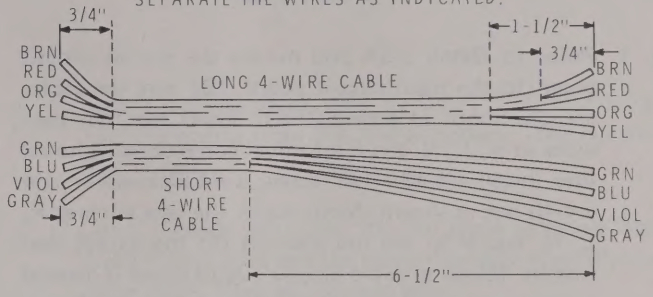
( ) Orange wire to hole C (S-1).

( ) Red wire to hole B (S-1).

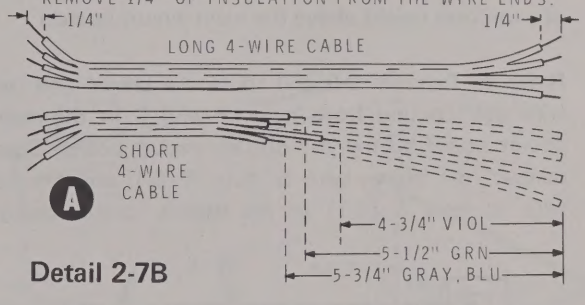
( ) Brown wire to hole A (S-1).

8-WIRE CABLE

SEPARATE THE WIRES AS INDICATED.



CUT THE WIRES TO THE INDICATED LENGTHS AND REMOVE 1/4" OF INSULATION FROM THE WIRE ENDS.



Detail 2-7B

Refer to Pictorial 2-8 (fold-out from Page 15) and position the display circuit board near the main circuit board. Then connect the free wire ends of the short 4-wire cable to the display circuit board as follows:

( ) Gray wire to hole H (S-1).

( ) Blue wire to hole F (S-1).

( ) Green wire to hole E (S-1).

( ) Violet wire to hole D (S-1).

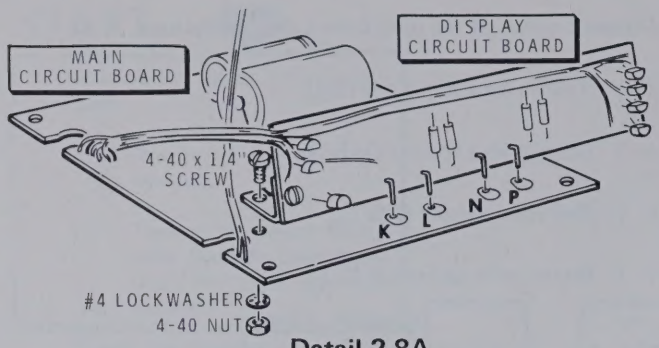
( ) Connect the free wire ends of the long 4-wire cable to the display circuit board as follows:

( ) Yellow wire to hole G (S-1).

( ) Orange wire to hole C (S-1).

( ) Red wire to hole B (S-1).

( ) Brown wire to hole A (S-1).



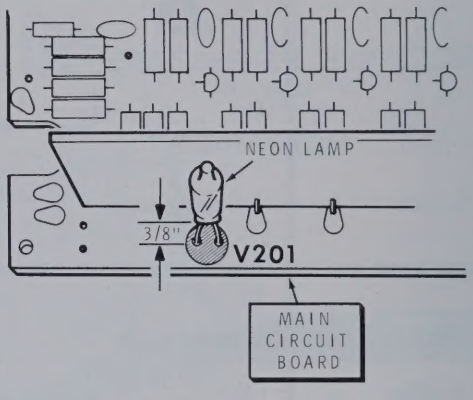
Detail 2-8A

( ) Refer to Detail 2-8A and mount the display circuit board to the main circuit board. (Be sure the cables are positioned as shown.) First, insert the four bare wires at K, L, N, and P into their corresponding holes; then install a 4-40 x 1/4" screw, a #4 lockwasher, and a 4-40 nut as shown. Next, solder the bare wires at K, L, N, and P to the foil and cut off the excess lead lengths. (Make sure the display circuit board is parallel to the main circuit board. That is, the display circuit board should be sitting on the main circuit board or be at a uniform height above the main circuit board.)

( ) Refer to Pictorial 2-8 and route the brown and red wire pair coming from holes R and S in the main circuit board behind the display circuit board. Then connect the brown wire to hole R (S-1) and the red wire to hole S (S-1) in the display circuit board. Connect the wires from the foil side of the circuit board. Tug lightly on the wires to be sure they are soldered.

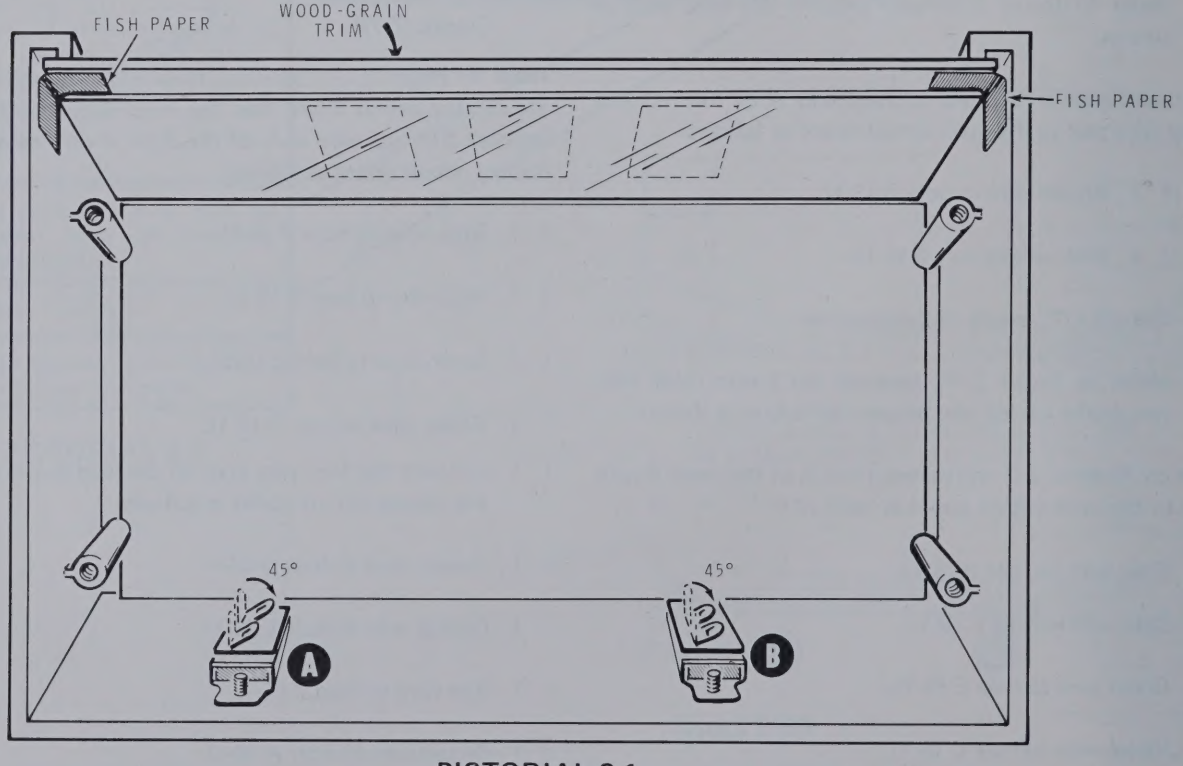
( ) Connect the blue wire coming from hole J in the main circuit board to hole J in the display circuit board (S-1).

( ) Refer to Detail 2-8B and install the neon lamp at V201 on the main circuit board. Mount it 3/8" above the circuit board, solder the leads to the foil, and cut off the excess lead lengths.

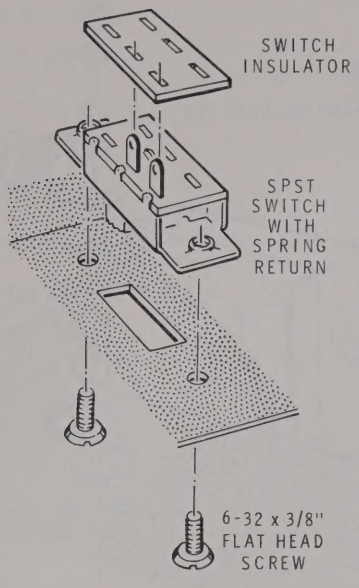


Detail 2-8B

( ) Temporarily set aside the circuit board assembly.



PICTORIAL 3-1



Detail 3-1A

CABINET TOP

Refer to Pictorial 3-1 for the following steps.

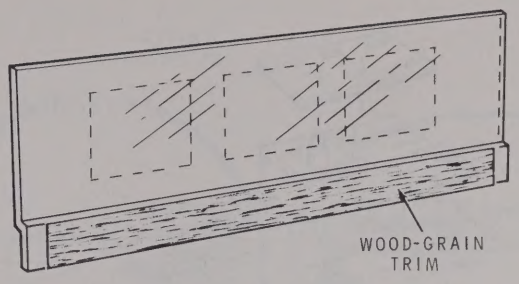
In the following steps, you will install parts in the cabinet top.

( ) Refer to Detail 3-1A and install an SPST switch with spring return at B. (Operate the switch to make sure it is a spring return switch.) Use two 6-32 x 3/8" flat head screws and be sure the switch lugs are positioned as shown.

( ) Slide a switch insulator over the switch lugs and bend the lugs as shown in the Pictorial.

( ) As before, mount an SPST switch (without spring return) at A. Use two 6-32 x 3/8" flat head screws and be sure the switch lugs are positioned as shown. Then slide a switch insulator over the switch lugs and bend the lugs.

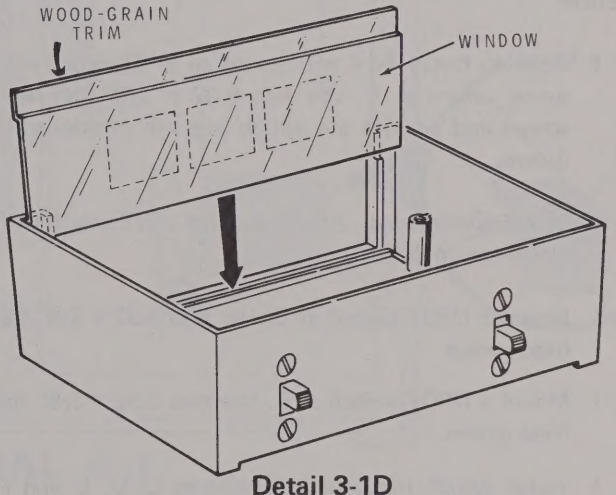
( ) Refer to Detail 3-1B, remove the narrow wood-grain trim piece from the protective paper backing, center the trim between the sides of the window, and apply it as shown.



Detail 3-1B

( ) Locate the fish paper, refer to Detail 3-1C, and cut a 1/4" wide strip from one end as shown. Then cut the strip in half.

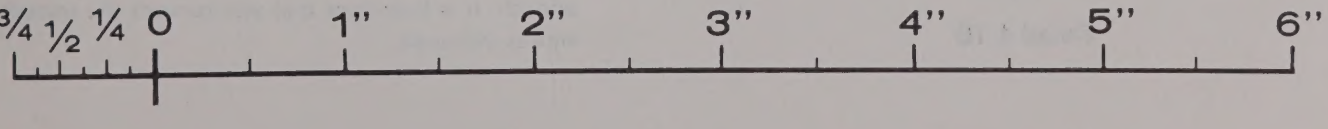
( ) Cut a 1" wide strip from the fish paper as shown. Set this 1" wide strip and the remaining large piece of fish paper aside. They will be used later.

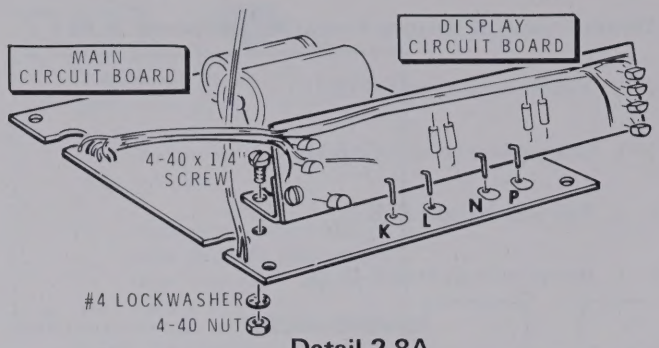


Detail 3-1D

( ) Refer to Detail 3-1D and mount the window. Remove the protective paper backing from the two 1/4" wide strips of fish paper and apply them to the window and cabinet top as shown in Pictorial 3-1 to hold the window in place.

( ) Set the cabinet top aside temporarily.





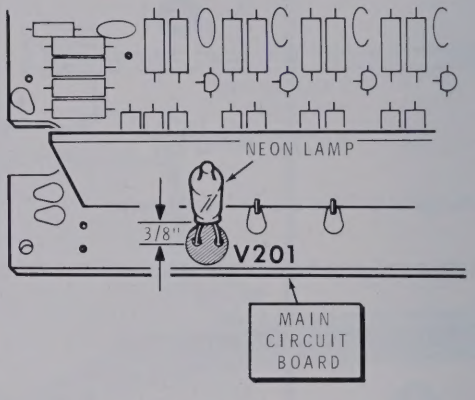
Detail 2-8A

( ) Refer to Detail 2-8A and mount the display circuit board to the main circuit board. (Be sure the cables are positioned as shown.) First, insert the four bare wires at K, L, N, and P into their corresponding holes; then install a 4-40 x 1/4" screw, a #4 lockwasher, and a 4-40 nut as shown. Next, solder the bare wires at K, L, N, and P to the foil and cut off the excess lead lengths. (Make sure the display circuit board is parallel to the main circuit board. That is, the display circuit board should be sitting on the main circuit board or be at a uniform height above the main circuit board.)

( ) Refer to Pictorial 2-8 and route the brown and red wire pair coming from holes R and S in the main circuit board behind the display circuit board. Then connect the brown wire to hole R (S-1) and the red wire to hole S (S-1) in the display circuit board. Connect the wires from the foil side of the circuit board. Tug lightly on the wires to be sure they are soldered.

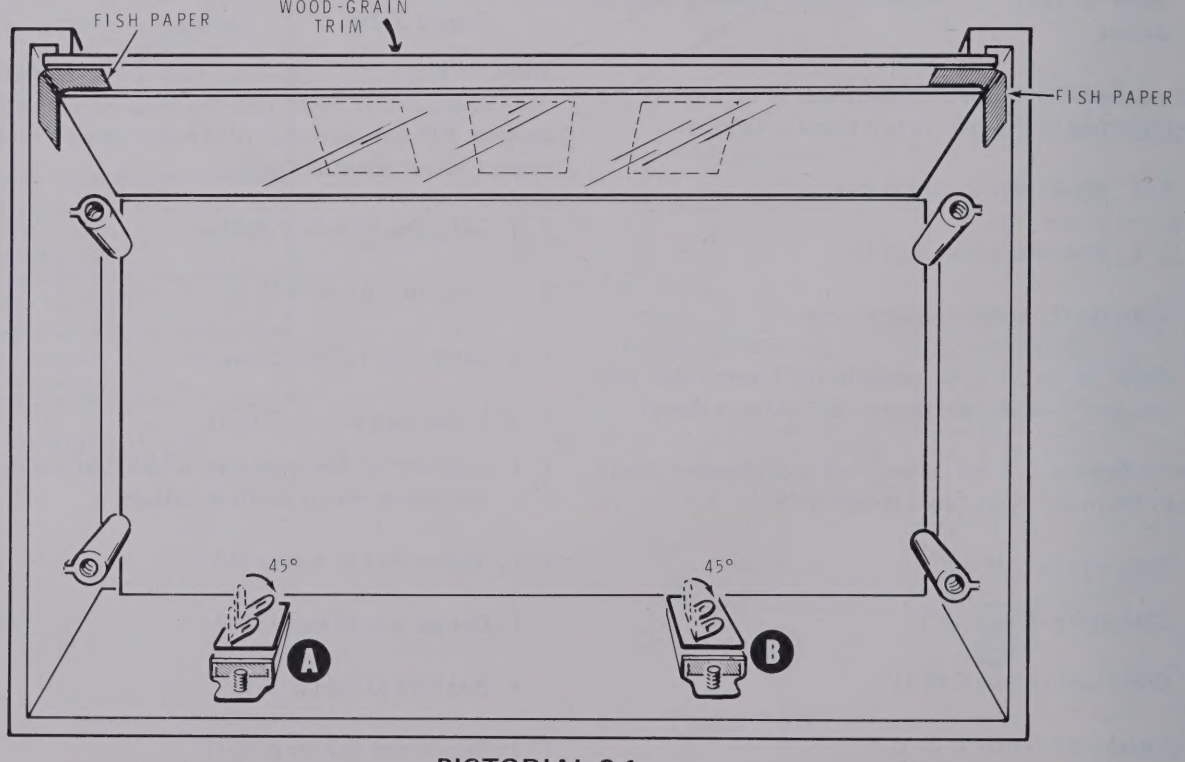
( ) Connect the blue wire coming from hole J in the main circuit board to hole J in the display circuit board (S-1).

( ) Refer to Detail 2-8B and install the neon lamp at V201 on the main circuit board. Mount it 3/8" above the circuit board, solder the leads to the foil, and cut off the excess lead lengths.

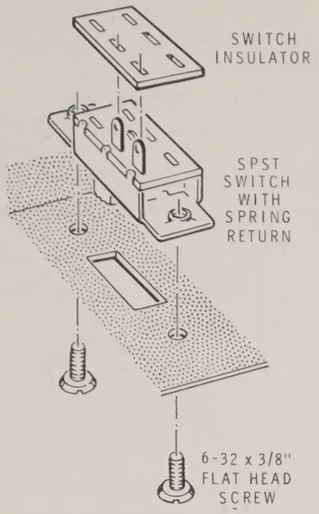


Detail 2-8B

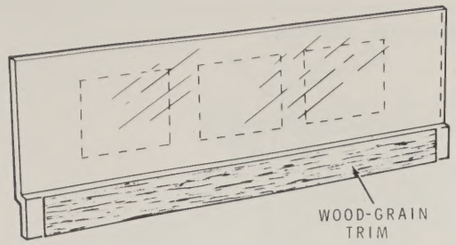
( ) Temporarily set aside the circuit board assembly.



PICTORIAL 3-1



Detail 3-1A



Detail 3-1B

CABINET TOP

Refer to Pictorial 3-1 for the following steps.

In the following steps, you will install parts in the cabinet top.

( ) Refer to Detail 3-1A and install an SPST switch with spring return at B. (Operate the switch to make sure it is a spring return switch.) Use two 6-32 x 3/8" flat head screws and be sure the switch lugs are positioned as shown.

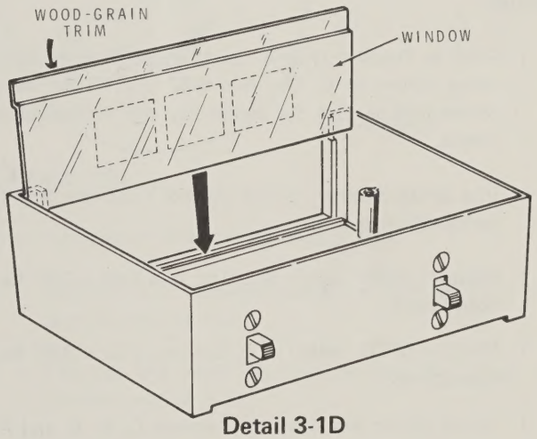
( ) Slide a switch insulator over the switch lugs and bend the lugs as shown in the Pictorial.

( ) As before, mount an SPST switch (without spring return) at A. Use two 6-32 x 3/8" flat head screws and be sure the switch lugs are positioned as shown. Then slide a switch insulator over the switch lugs and bend the lugs.

( ) Refer to Detail 3-1B, remove the narrow wood-grain trim piece from the protective paper backing, center the trim between the sides of the window, and apply it as shown.

( ) Locate the fish paper, refer to Detail 3-1C, and cut a 1/4" wide strip from one end as shown. Then cut the strip in half.

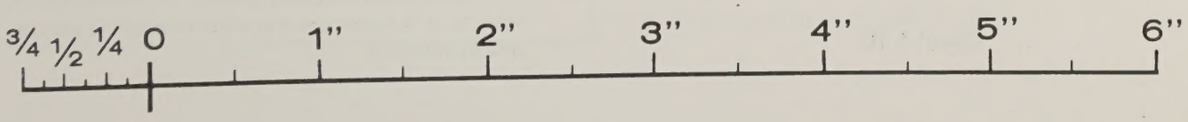
( ) Cut a 1" wide strip from the fish paper as shown. Set this 1" wide strip and the remaining large piece of fish paper aside. They will be used later.

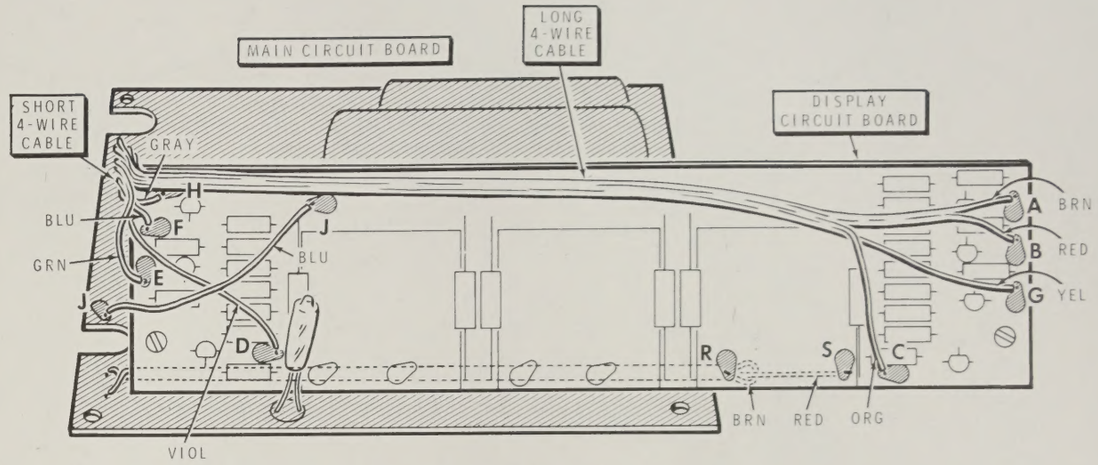


Detail 3-1D

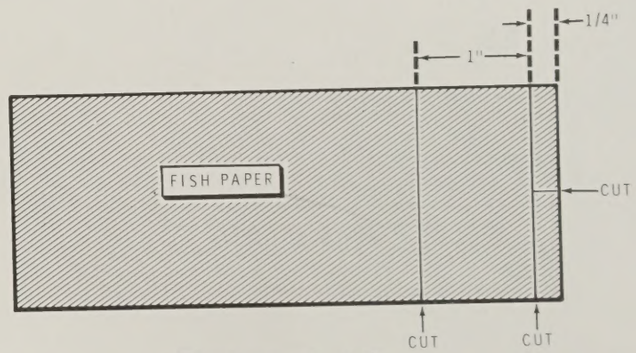
( ) Refer to Detail 3-1D and mount the window. Remove the protective paper backing from the two 1/4" wide strips of fish paper and apply them to the window and cabinet top as shown in Pictorial 3-1 to hold the window in place.

( ) Set the cabinet top aside temporarily.

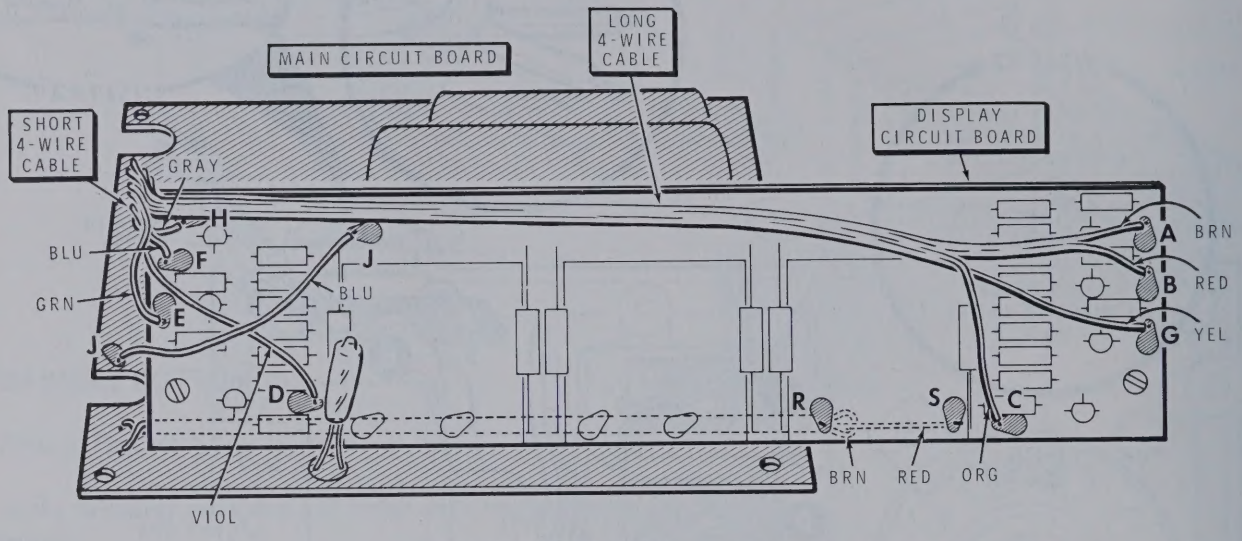




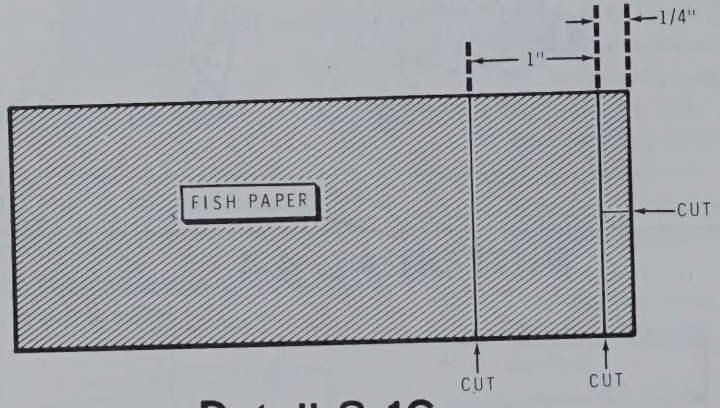
PICTORIAL 2-8



Detail 3-1C



PICTORIAL 2-8



Detail 3-1C

( ) Connect the smooth line cord wire to lug 1 of terminal strip H (NS). Make a mechanically secure connection.

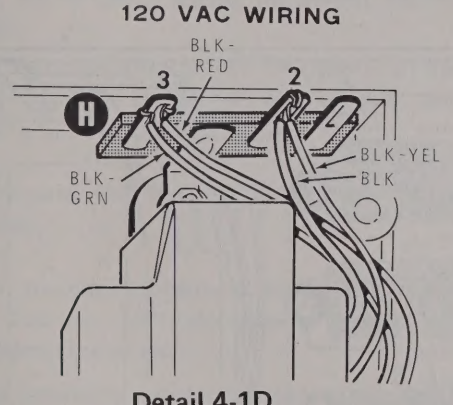
( ) Connect the ribbed line cord wire to lug 2 of terminal strip H (NS). Make a mechanically secure connection.

( ) Refer to inset drawing #3 on the Pictorial and slide the sleeving over the 3/16-ampere slow-blow fuse as shown.

( ) Connect the fuse from lug 1 (S-2) to lug 3 (NS) of terminal strip H. Make mechanically secure connections and position the fuse as close to the terminal strip as possible.

ALTERNATE LINE VOLTAGE WIRING

Two sets of line voltage wiring instructions are given below, one for 120 VAC line voltage and the other for 240 VAC line voltage. In the U.S.A., 120 VAC is most often used, while in foreign countries 240 VAC is more common. USE ONLY THE INSTRUCTIONS THAT AGREE WITH THE LINE VOLTAGE IN YOUR AREA.



Detail 4-1D

120 VAC Wiring

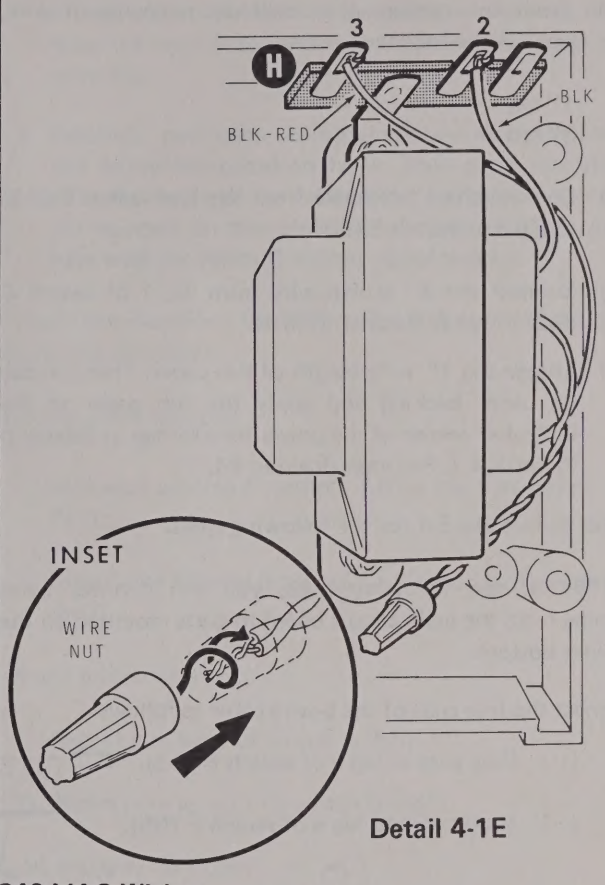
Refer to Detail 4-1D for the following steps. Be sure to make mechanically secure connections.

( ) Connect the black-red transformer lead to lug 3 of terminal strip H (NS).

( ) Connect the black-green transformer lead to lug 3 of terminal strip H (S-3).

( ) Connect the black-yellow transformer lead to lug 2 of terminal strip H (NS).

( ) Connect the black transformer lead to lug 2 of terminal strip H (S-3).



Detail 4-1E

240 VAC Wiring

Refer to Detail 4-1E for the following steps.

( ) Connect the black-red transfomer lead to lug 3 of terminal strip H (S-2).

( ) Connect the black transformer lead to lug 2 of terminal strip H (S-2).

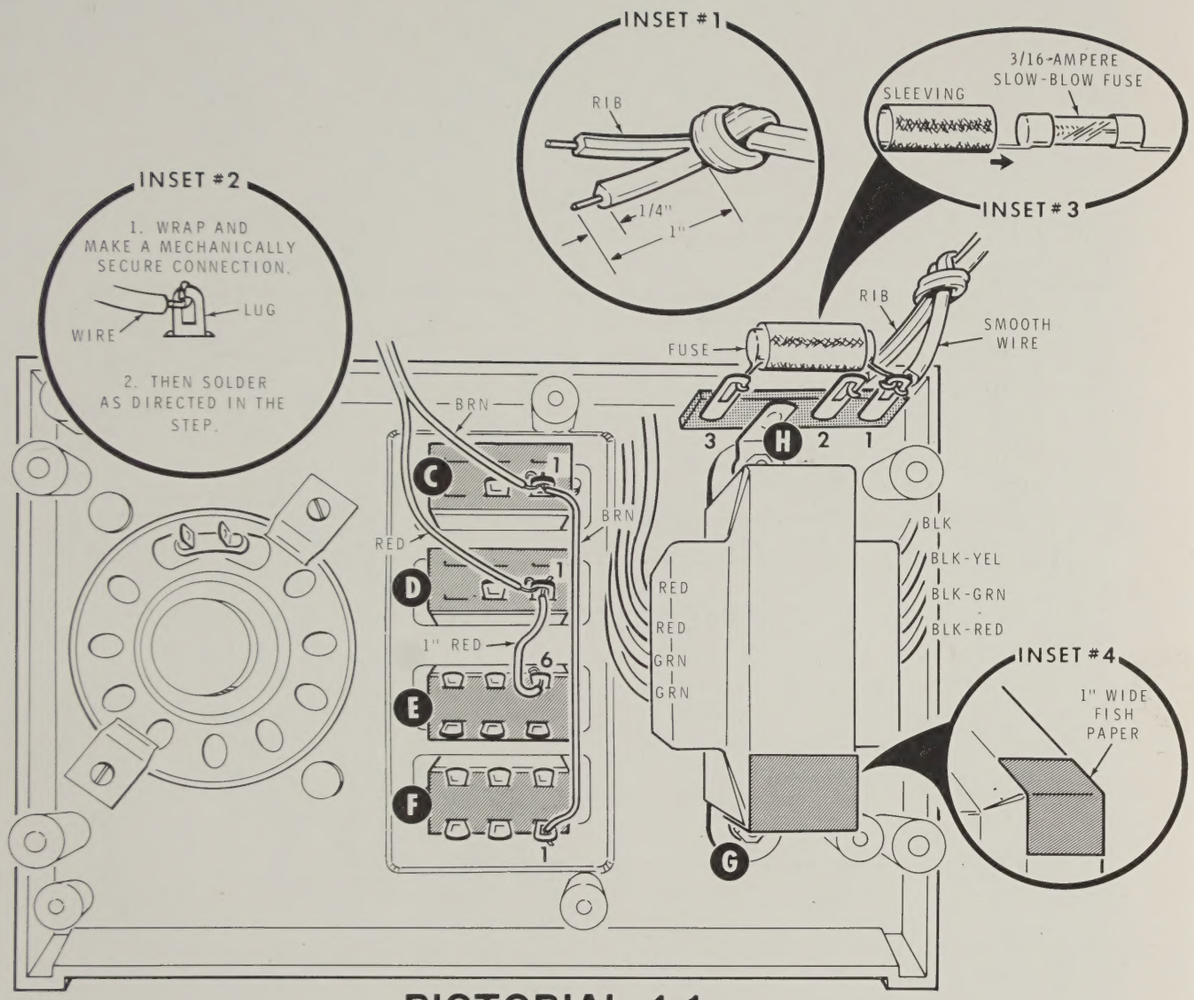
( ) Twist the ends of the black-green and black-yellow transformer leads together in a clockwise direction. Then twist the wire nut onto the wires in a clockwise direction. Refer to the inset drawing.

OTHER WIRING

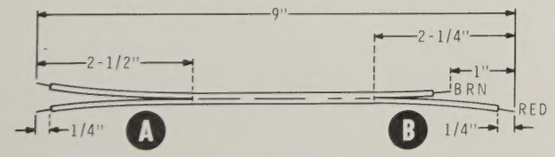
( ) Locate the remaining red and brown wire pair, cut it to a length of 9", and prepare the ends as shown in Detail 4-1F.

Connect end B of the red and brown wires as follows:

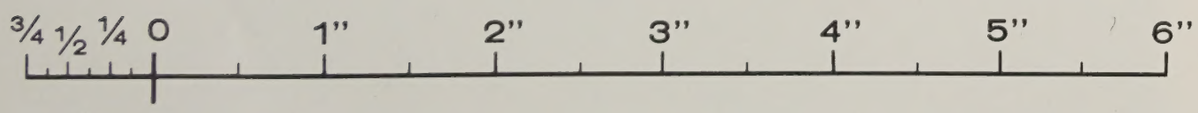
( ) Red wire to lug 1 of switch D (NS).

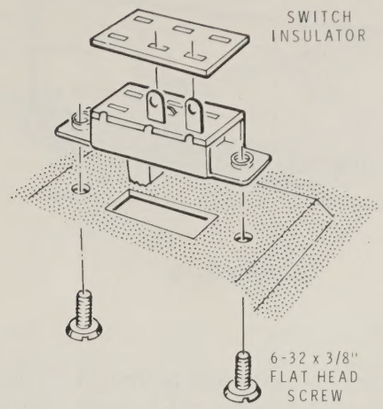


PICTORIAL 4-1



Detail 4-1F





Detail 4-1A

CABINET BOTTOM

Refer to Pictorial 4-1 for the following steps.

In the following steps you will install parts in the cabinet bottom.

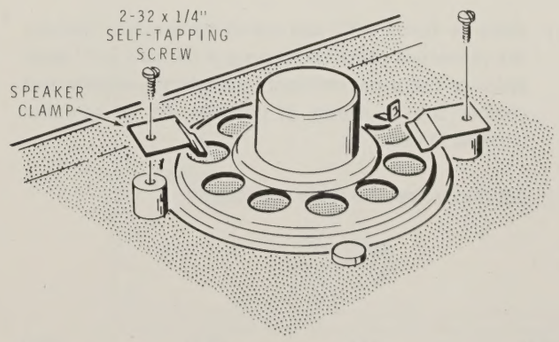
( ) Refer to Detail 4-1A and mount an SPST switch with spring return at C. Use two 6-32 x 3/8" flat head screws and be sure the switch lugs are positioned as shown.

( ) In a similar manner, mount another SPST switch with spring return at D.

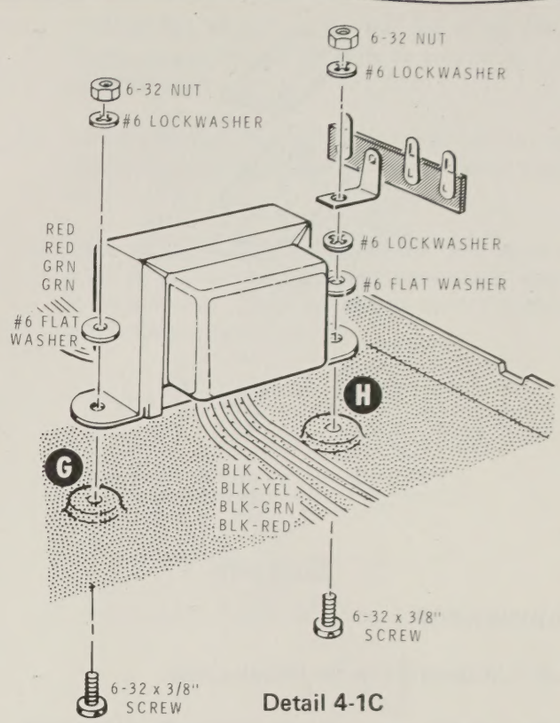
( ) Mount a DPDT switch at E. Use two 6-32 x 3/8" flat head screws.

( ) Mount a DPDT switch at F. Use two 6-32 x 3/8" flat head screws.

( ) Install switch insulators on switches C, D, E, and F; and bend the lugs to 45° as shown.



Detail 4-1B



Detail 4-1C

( ) Refer to Detail 4-1B and install the speaker as shown. Use two speaker clamps and two 2-32 x 1/4" self-tapping screws. Do not overtighten the screws.

( ) Refer to Detail 4-1C and mount the transformer. Be sure the wires are as shown. Use a 6-32 x 3/8" screw, a #6 flat washer, a #6 lockwasher, and a 6-32 nut at G. Use a 6-32 x 3/8" screw, a #6 flat washer, two #6 lockwashers, a terminal strip, and a 6-32 nut at H.

( ) Refer to inset drawing #1 on Pictorial 4-1 and prepare the end of the line cord.

( ) Twist the bare wire strands together and melt a small amount of solder on the strands to hold them together.

NOTES:

1. In some of the following steps you will be directed to "make a mechanically secure connection." Do this by inserting the wire through a lug or terminal, or wrapping it around the lug or terminal, or both, before soldering. See inset drawing #2 on the Pictorial.

2. The line cord has one of its outer wires marked with a rib in the insulation along its edge. The other wire is smooth. It is important that you connect the smooth wire as indicated.

( ) Connect the smooth line cord wire to lug 1 of terminal strip H (NS). Make a mechanically secure connection.

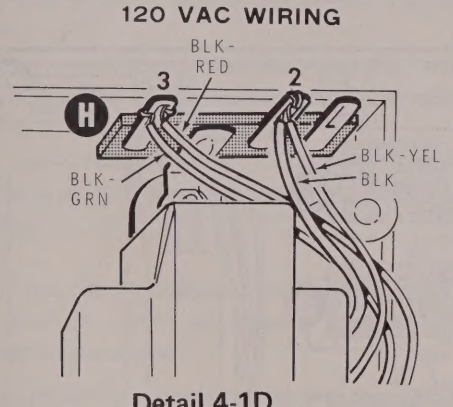
( ) Connect the ribbed line cord wire to lug 2 of terminal strip H (NS). Make a mechanically secure connection.

( ) Refer to inset drawing #3 on the Pictorial and slide the sleeving over the 3/16-ampere slow-blow fuse as shown.

( ) Connect the fuse from lug 1 (S-2) to lug 3 (NS) of terminal strip H. Make mechanically secure connections and position the fuse as close to the terminal strip as possible.

ALTERNATE LINE VOLTAGE WIRING

Two sets of line voltage wiring instructions are given below, one for 120 VAC line voltage and the other for 240 VAC line voltage. In the U.S.A., 120 VAC is most often used, while in foreign countries 240 VAC is more common. USE ONLY THE INSTRUCTIONS THAT AGREE WITH THE LINE VOLTAGE IN YOUR AREA.



Detail 4-1D

120 VAC Wiring

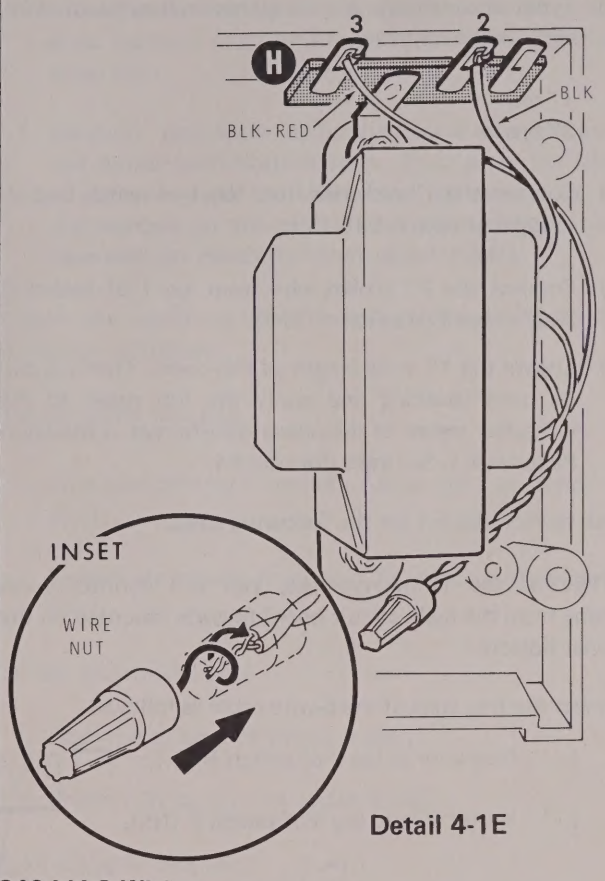
Refer to Detail 4-1D for the following steps. Be sure to make mechanically secure connections.

( ) Connect the black-red transformer lead to lug 3 of terminal strip H (NS).

( ) Connect the black-green transformer lead to lug 3 of terminal strip H (S-3).

( ) Connect the black-yellow transformer lead to lug 2 of terminal strip H (NS).

( ) Connect the black transformer lead to lug 2 of terminal strip H (S-3).



Detail 4-1E

240 VAC Wiring

Refer to Detail 4-1E for the following steps.

( ) Connect the black-red transfomer lead to lug 3 of terminal strip H (S-2).

( ) Connect the black transformer lead to lug 2 of terminal strip H (S-2).

( ) Twist the ends of the black-green and black-yellow transformer leads together in a clockwise direction. Then twist the wire nut onto the wires in a clockwise direction. Refer to the inset drawing.

OTHER WIRING

( ) Locate the remaining red and brown wire pair, cut it to a length of 9", and prepare the ends as shown in Detail 4-1F.

Connect end B of the red and brown wires as follows:

( ) Red wire to lug 1 of switch D (NS).

( ) Brown wire to lug 1 of switch C (NS).

( ) From the remaining miscellaneous lengths of wire, prepare the following wires:

1" red
3" brown

( ) Connect the 1" red wire from lug 1 of switch D (S-2) to lug 6 of switch E (S-1).

( ) Connect the 3" brown wire from lug 1 of switch C (S-2) to lug 1 of switch F (S-1).

( ) Locate the 1" wide length of fish paper. Then remove its paper backing and apply the fish paper to the indicated corner of the power transformer as shown in Pictorial 4-1. See inset drawing #4.

Refer to Pictorial 5-1 for the following steps.

NOTE: In the following steps, you will connect wires coming from the main circuit board to parts mounted on the cabinet bottom.

Connect the free ends of the 5-wire cable as follows:

( ) Blue wire to lug 2 of switch F (S-1).

( ) Violet wire to lug 6 of switch F (NS).

( ) Green wire to lug 5 of switch E (S-1).

( ) Yellow wire to lug 2 of switch D (S-1).

( ) Orange wire to lug 2 of switch C (S-1).

( ) Connect the orange wire coming from hole AS to lug 5 of switch F (NS).

( ) Prepare the following wires:

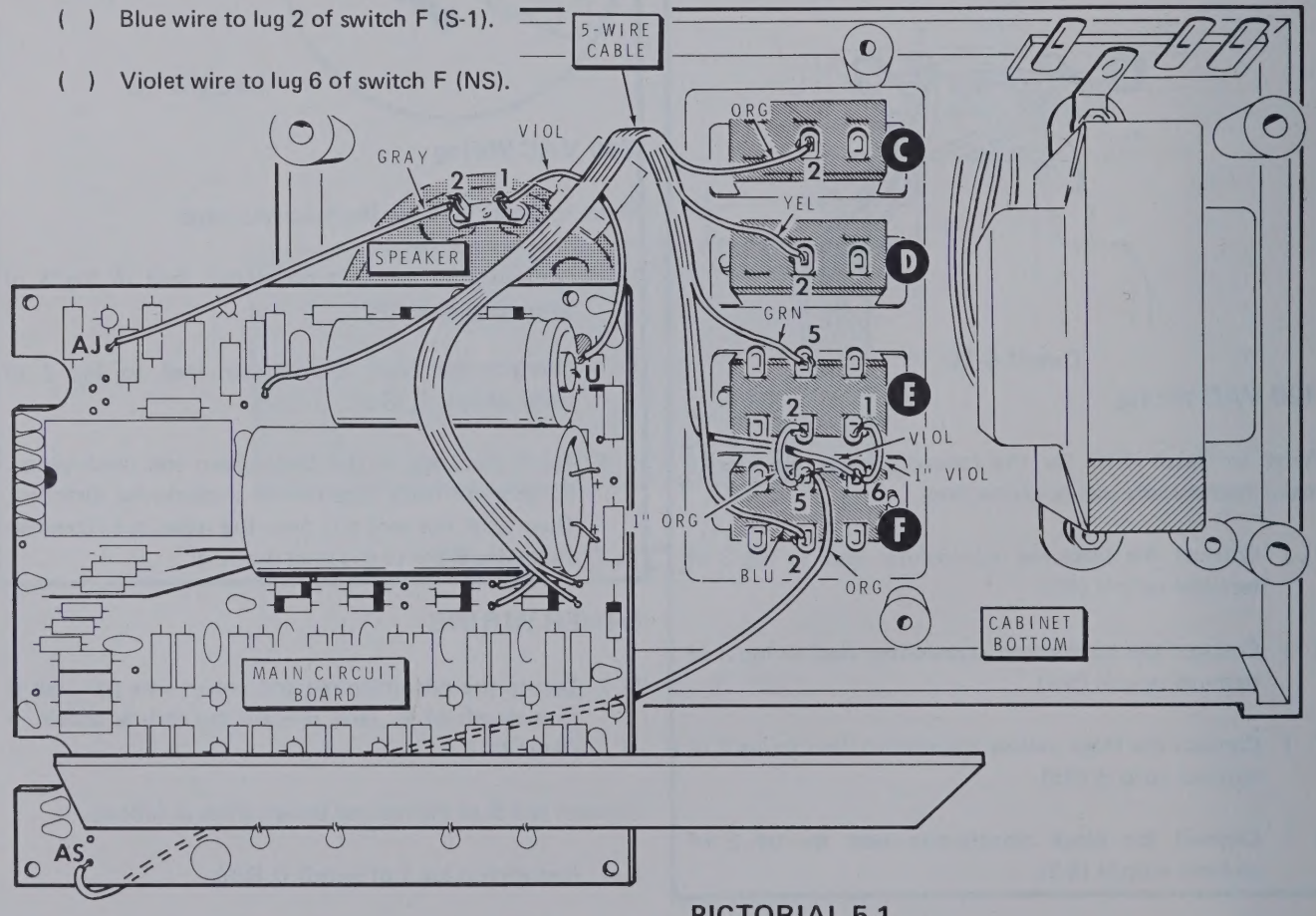
1" orange
1" violet

( ) Connect the 1" orange wire from lug 2 of switch E (S-1) to lug 5 of switch F (S-2).

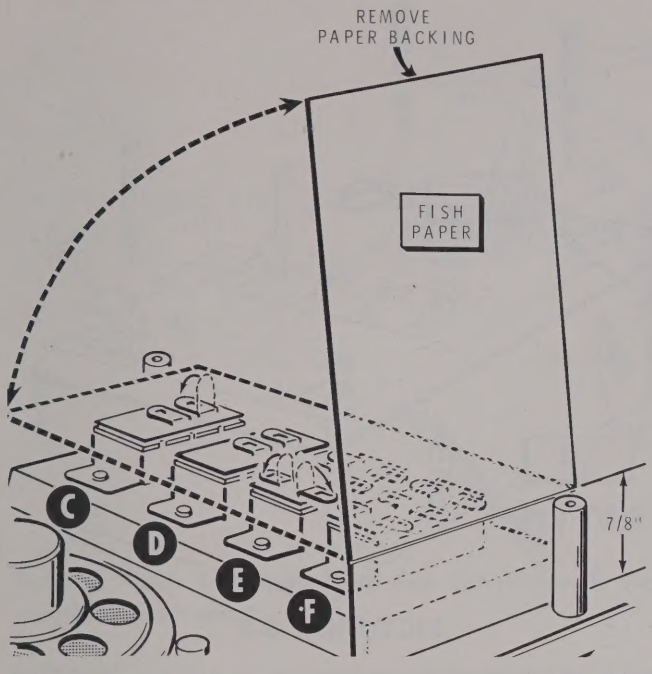
( ) Connect the 1" violet wire from lug 1 of switch E (S-1) to lug 6 of switch F (S-2).

( ) Connect the violet wire coming from hole U to lug 1 of the speaker (S-1).

( ) Connect the gray wire coming from hole AJ to lug 2 of the speaker (S-1).



PICTORIAL 5-1



Detail 5-1A

( ) Refer to Detail 5-1A and bend the lugs of switches C, D, E, and F down against the switch insulators as shown.

( ) Bend the remaining length of fish paper 7/8" from one end, remove the protective paper backing, and cover switches C, D, E, and F as shown.

Refer to Pictorial 5-2 (fold-out from Page 23) for the following steps.

( ) Mount the circuit boards to the cabinet bottom. Use five 2-32 x 1/4" self-tapping screws. Do not overtighten the screws.

Connect the remaining transformer leads to the main circuit board as follows:

( ) Either red wire to the connector pin at hole X (S-1). See inset drawing #1.

( ) Other red wire to the connector pin at hole Y (S-1).

( ) Either green wire to the connector pin at hole Z (S-1).

( ) Other green wire to the connector pin at hole T (S-1) NOTE: Be sure the connector pin is not touching the 1200 μF capacitor.

( ) Locate the fuse label and record the fuse rating on the label (3/16 ampere).

( ) Remove the paper backing from the fuse label. Then position the label onto the inside of the cabinet top as shown, cover the label with the paper backing, and press the label in place. This will prevent any ink from smearing.

( ) Carefully peel away the backing paper from the blue and white identification label. Then press the label onto the inside of the cabinet top. Be sure to refer to the numbers on this label in any communications you have with the Heath Company about this kit.

Connect the remaining free wire ends to the switches in the cabinet top as follows:

Blue and green wire pair.

( ) Blue wire coming from hole AD to lug 1 of switch A (S-1).

( ) Green wire coming from hole AC to lug 2 of switch B (S-1).

Red and brown wire pair.

( ) Red wire to lug 2 of switch A (NS).

( ) Brown wire to lug 1 of switch B (NS).

Violet and gray wire pair.

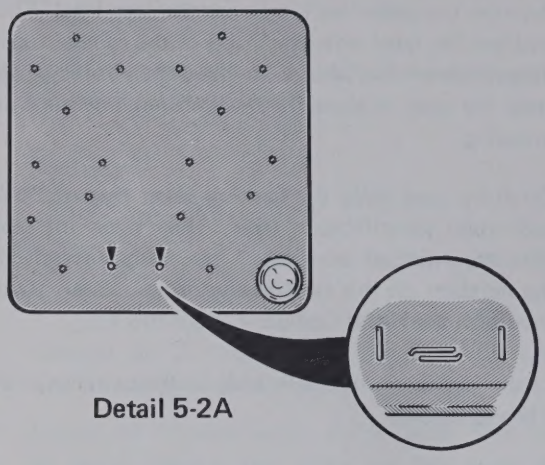
( ) Violet wire coming from hole AB to lug 2 of switch A (S-2).

( ) Gray wire coming from hole AA to lug 1 of switch B (S-2).

This completes the wiring of your Heathkit Electronic Clock. Carefully inspect all connections for loose wires or unsoldered connections. Remove any wire clippings or solder splashes. Then continue with the assembly steps.

NOTE: The integrated circuit (IC) can be damaged by static voltage. To prevent this, be sure you have no static voltage built up on your person or clothing before you handle the IC.

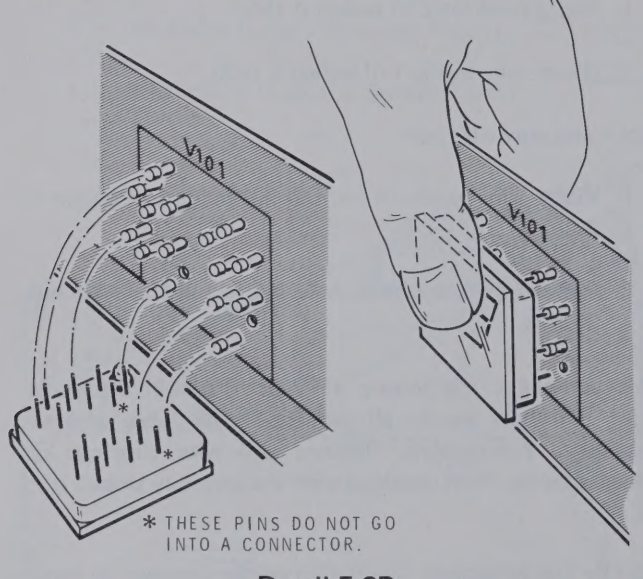
( ) Locate the MK5017AA integrated circuit (#443-601). Position the dot end of the IC over the half dot screened on the main circuit board. Then insert the IC leads into the IC socket. (See inset drawing #2.) Be sure each IC lead is properly inserted. DO NOT solder the IC to the socket.



Detail 5-2A

( ) Refer to Detail 5-2A and position your display tubes as shown. If your display tubes have the two pins marked with a ▼, bend these two pins toward each other as shown in the inset drawing. They will not be used. If your display tubes do not have these pins, proceed to the next step.

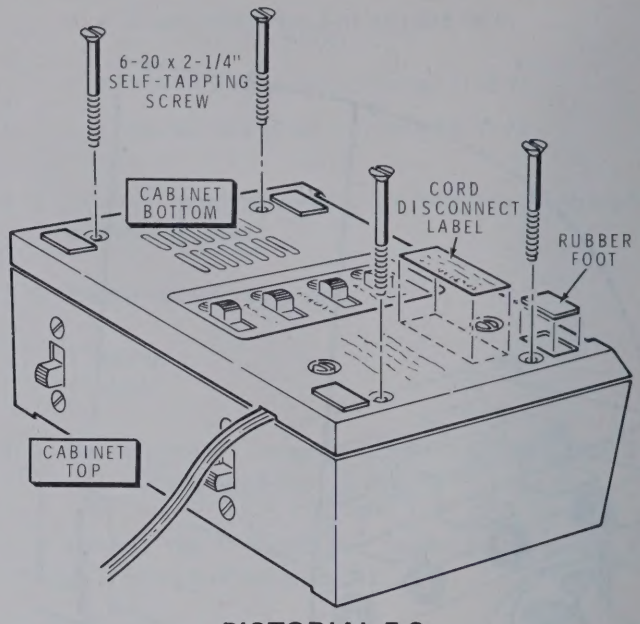
NOTE: When you install the display tubes in the following steps, support the rear of the readout circuit board as shown to prevent breaking the circuit board.



Detail 5-2B

( ) Refer to Detail 5-2B and install a display tube at V101. Examine the pins to make sure they are straight (except as explained in the previous step) before you install the tube. As you install each tube, watch the leads to make sure each one goes into its connector, if it has one. NOTE: Not all the leads go into connectors.

( ) Likewise, install display tubes at V102 and V103.



PICTORIAL 5-3

Refer to Pictorial 5-3 for the following steps.

NOTE: In the following step, be sure you do not pinch any wires between the cabinet top and cabinet bottom.

( ) Position the cabinet top over the cabinet bottom. Then lower the top straight down onto the bottom. (This will keep the window from being scratched by the corners of the display tubes.) NOTE: Be sure the line cord knot is positioned inside the cabinet and the line cord is in the channel provided for it in the cabinet.

( ) Fasten the cabinet top and bottom together with four 6-20 x 2-1/4" self-tapping screws.

( ) Remove the paper backing from the rubber feet and install the feet at the four corners as shown.

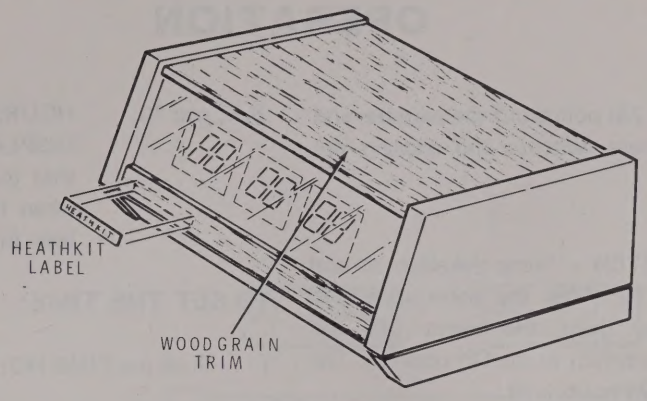
( ) Remove the paper backing from the cord disconnect label and press the label into position as shown.

DECORATING

( ) Remove the backing paper from the Heathkit label and apply it to the front of the cabinet as shown in Pictorial 6-1.

( ) The use of the remaining piece of wood-grain trim is optional. Apply it to the cabinet top if you so desire.

This completes the "Step-by-Step Assembly."



PICTORIAL 6-1

INITIAL TESTS

Refer to Figure 2 (fold-out from Page 23) to identify the function of each switch.

NOTE: If you do not obtain the proper results in any of the following steps, unplug the line cord plug and proceed to the "In Case of Difficulty" section on Page 22.

( ) Set the six switches to the positions shown.

( ) Plug the line cord plug into an AC outlet. Each of the six display digits should indicate an eight.

( ) Push the TIME HOLD switch to the right and back again. The display should now indicate 12:00:00 or 00:00:00 and start keeping time.

( ) Push the Alarm Set switch to the right. The display should now indicate 12:00:00 or 00:00:00 and the AM-PM lamp should be on.

( ) Push and hold the HOURS SET-AHEAD switch to the right. The HOURS DISPLAY will now advance one digit each half second. The AM-PM lamp will turn on and off each six seconds.

( ) Release the HOURS SET-AHEAD switch.

( ) Push and hold the MINUTES SET-AHEAD switch to the right. The MINUTES DISPLAY will now advance one digit each half second.

( ) Push both the MINUTES SET-AHEAD switch and the HOURS SET-AHEAD switch to the right. The tens of minutes will now advance one digit each half second.

( ) Push the MINUTES and HOURS SET-AHEAD switches as necessary until the MINUTES DISPLAY indicates 45 minutes; then quickly release the MINUTES SET-AHEAD switch.

( ) Continue holding the HOURS SET-AHEAD switch until the HOURS DISPLAY indicates 6 and the AM-PM lamp is on (indicating AM). Then quickly release the switch.

( ) Push the ALARM SET switch to the left.

( ) Push the ALARM ON-OFF switch to the ON (down) position.

( ) Push the TIME HOLD switch to the right.

( ) Push both the HOURS SET-AHEAD switch and the MINUTES SET-AHEAD switch to the right as necessary until the MINUTES DISPLAY indicates 44 minutes. Then quickly release the MINUTES SET-AHEAD switch.

( ) Continue holding the HOURS SET-AHEAD switch until the HOURS DISPLAY indicates 6 and the AM-PM lamp is on (indicating AM). Then quickly release the switch.

( ) Push the TIME HOLD switch to the left. The clock should now start keeping time and in approximately one minute the alarm should sound.

( ) When the alarm sounds, push the SNOOZE ALARM switch down (to reset the snooze alarm) and release the switch. In approximately seven minutes, the alarm should sound again.

( ) Push the ALARM ON-OFF switch up to the OFF position.

This completes the "Initial Tests."

OPERATION

Figure 2 (fold-out from Page 23) points out the switches and displays of your Clock. These switches and displays are further described below.

1. ALARM ON-OFF SWITCH – Turns the alarm on and off. Down is on. NOTE: After the alarm sounds, if you wish, you may turn the alarm off and immediately return the switch to the ON position. The alarm will then sound 24 hours later.

2. SNOOZE ALARM SWITCH – Resets the alarm to go off seven minutes later.

3. HOURS SET-AHEAD SWITCH – Advances the HOURS DISPLAY one hour each half second.

4. MINUTES SET-AHEAD SWITCH – Advances the MINUTES DISPLAY one minute each half second.

3 and 4. When used together, they advance the MINUTES DISPLAY ten minutes each half second.

5. ALARM SET SWITCH – Allows you to set the alarm using the HOURS and MINUTES SET-AHEAD switches. Also allows the display to indicate the time for which the alarm is set. (Time continues to be kept even though it is not displayed when this switch is being used.)

6. TIME HOLD SWITCH – Allows you to set the Clock ahead to the desired time, using the HOURS and MINUTES SET-AHEAD switches, and then start the clock when the desired time arrives.

7. AM-PM LAMP – Indicates AM when on and PM when off; only when setting the alarm or the time.

8, 9, and 10. HOURS, MINUTES, and SECONDS DISPLAY – Indicate the time or the time that the alarm is set for. Indicates all 8's when first plugged in or when power has been interrupted for several seconds.

TO SET THE TIME:

1. Push the TIME HOLD switch to the right.

2. Push the MINUTES SET-AHEAD and HOURS SET-AHEAD switches (separately or together) as necessary to advance the display to a desired time. Be sure the AM-PM lamp is on or off as desired – on is AM; off is PM.

3. Watch another clock. When the time gets to the time on the display, push the TIME HOLD switch to the left.

TO SET THE ALARM:

1. Push the ALARM-SET switch to the right. (The clock will continue to keep time, even though the display is stationary.)

2. Push the MINUTES SET-AHEAD and HOURS SET-AHEAD switches (separately or together) as necessary to advance the display to a desired time. Be sure the AM-PM lamp is on or off as desired – on is AM; off is PM.

3. Push the ALARM-SET switch to the left.

4. Push the ALARM ON-OFF switch down to the ON position.

FOR DAYLIGHT SAVINGS TIME:

1. Push the HOURS SET-AHEAD switch to the right and advance the HOURS DISPLAY to the desired hour. NOTE: To go back an hour, advance the display 23 hours.

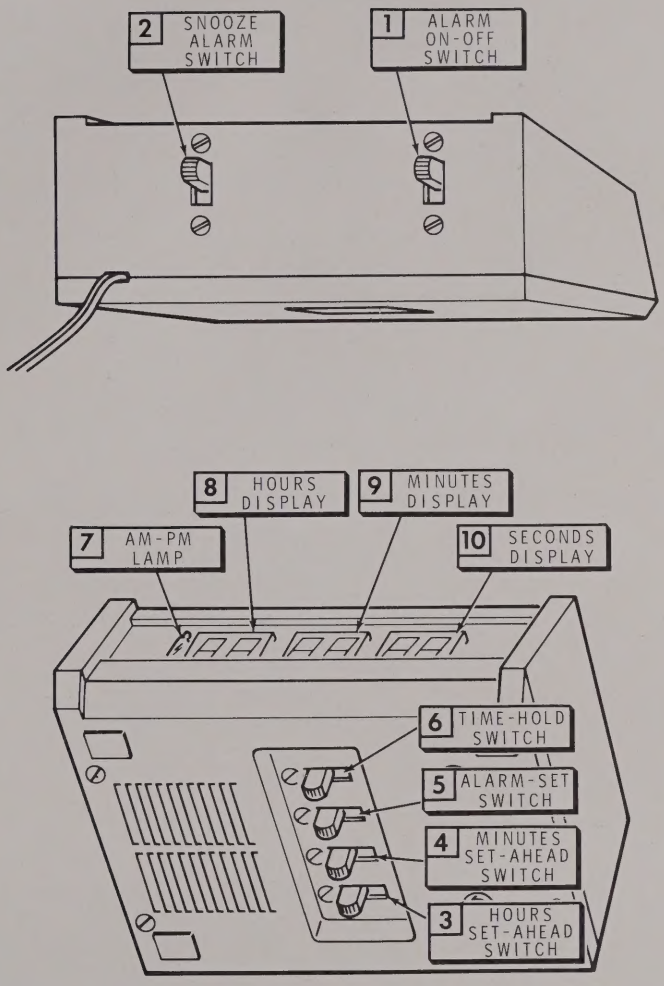

2 SNOOZE ALARM SWITCH
1 ALARM ON-OFF SWITCH
8 HOURS DISPLAY
9 MINUTES DISPLAY
7 AM-PM LAMP
10 SECONDS DISPLAY
6 TIME-HOLD SWITCH
5 ALARM-SET SWITCH
4 MINUTES SET-AHEAD SWITCH
3 HOURS SET-AHEAD SWITCH

Figure 2

OPERATION

Figure 2 (fold-out from Page 23) points out the switches and displays of your Clock. These switches and displays are further described below.

1. ALARM ON-OFF SWITCH – Turns the alarm on and off. Down is on. NOTE: After the alarm sounds, if you wish, you may turn the alarm off and immediately return the switch to the ON position. The alarm will then sound 24 hours later.

2. SNOOZE ALARM SWITCH – Resets the alarm to go off seven minutes later.

3. HOURS SET-AHEAD SWITCH – Advances the HOURS DISPLAY one hour each half second.

4. MINUTES SET-AHEAD SWITCH – Advances the MINUTES DISPLAY one minute each half second.

3 and 4. When used together, they advance the MINUTES DISPLAY ten minutes each half second.

5. ALARM SET SWITCH – Allows you to set the alarm using the HOURS and MINUTES SET-AHEAD switches. Also allows the display to indicate the time for which the alarm is set. (Time continues to be kept even though it is not displayed when this switch is being used.)

6. TIME HOLD SWITCH – Allows you to set the Clock ahead to the desired time, using the HOURS and MINUTES SET-AHEAD switches, and then start the clock when the desired time arrives.

7. AM-PM LAMP – Indicates AM when on and PM when off; only when setting the alarm or the time.

8, 9, and 10. HOURS, MINUTES, and SECONDS DISPLAY – Indicate the time or the time that the alarm is set for. Indicates all 8's when first plugged in or when power has been interrupted for several seconds.

TO SET THE TIME:

1. Push the TIME HOLD switch to the right.

2. Push the MINUTES SET-AHEAD and HOURS SET-AHEAD switches (separately or together) as necessary to advance the display to a desired time. Be sure the AM-PM lamp is on or off as desired – on is AM; off is PM.

3. Watch another clock. When the time gets to the time on the display, push the TIME HOLD switch to the left.

TO SET THE ALARM:

1. Push the ALARM-SET switch to the right. (The clock will continue to keep time, even though the display is stationary.)

2. Push the MINUTES SET-AHEAD and HOURS SET-AHEAD switches (separately or together) as necessary to advance the display to a desired time. Be sure the AM-PM lamp is on or off as desired – on is AM; off is PM.

3. Push the ALARM-SET switch to the left.

4. Push the ALARM ON-OFF switch down to the ON position.

FOR DAYLIGHT SAVINGS TIME:

1. Push the HOURS SET-AHEAD switch to the right and advance the HOURS DISPLAY to the desired hour. NOTE: To go back an hour, advance the display 23 hours.

IN CASE OF DIFFICULTY

This section of the Manual is divided into two parts. The first part, titled "General Troubleshooting Information," describes what to do about the difficulties that may occur right after your Clock is assembled.

The second part, titled "Troubleshooting Chart," is provided to assist you in servicing the Clock if the "General Troubleshooting Information" fails to clear up the problem, or if difficulties occur after your Clock has been in use for some time. The "Troubleshooting Chart" lists a number of possible difficulties that could arise along with several possible solutions to those difficulties.

Try to analyze the symptoms of any problem you might have before starting any troubleshooting procedure. This can usually be accomplished by trying the various functions of your Clock to determine abnormal operations. A review of the "Operation" section above may help your analysis.

NOTE: Refer to the "Circuit Board X-Ray Views" on Pages 28 and 29 for the physical location of parts on the circuit boards.

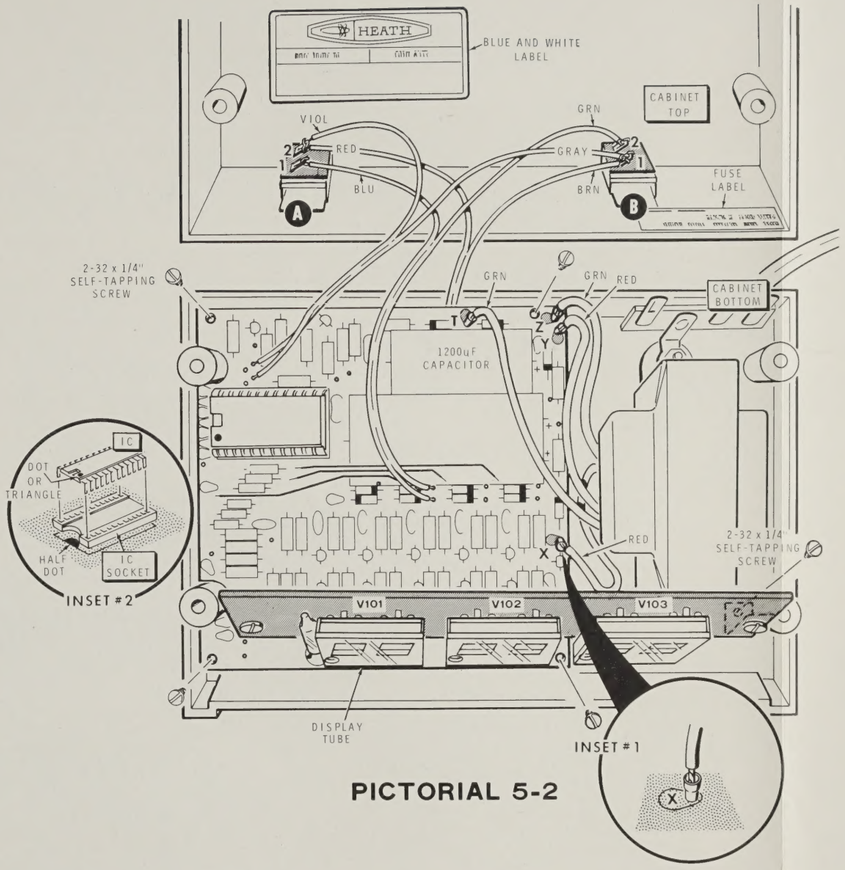
GENERAL TROUBLESHOOTING INFORMATION

1. Check all the wires that are connected between the two circuit boards and between the circuit boards and other parts. Trace each wire in colored pencil on the Pictorial as it is checked. Make sure these wires are connected to the proper points and are properly soldered. Someone who is not familiar with the unit may notice something you have consistently overlooked.
2. Be sure the IC is seated properly in its socket.
3. About 90% of the kits that are returned for repair do not function properly because of poor connections and soldering. Therefore, many troubles can be located by a careful inspection of connections to make sure they are soldered as described in the "Soldering" section of the "Kit Builders Guide." Reheat any doubtful connections.
4. Closely examine each circuit board foil in a good light to see that no solder bridges exist between adjacent connections. If available, a magnifying glass would be helpful for this purpose. Remove any solder bridges by holding a clean, hot soldering iron tip between the two points that are bridged until the excess solder flows down onto the tip. Compare your foil pattern against the "X-Ray Views" on Pages 28 and 29.
5. Be sure each transistor is in its proper location (correct part number and/or type number). Be sure that each transistor lead is in the right hole and has a good solder connection to the foil.
6. Check the integrated circuit for proper positioning. (Be sure the dot or notched end of the IC is over the half dot printed on the circuit board.)
7. Check each capacitor value. Be sure that a capacitor of correct value is installed at each capacitor location. Check each electrolytic capacitor to be sure the lead near the positive (+) marking is at the correct position.
8. Check each resistor value carefully. It would be easy, for example, to install a 2200 Ω (red-red-red) resistor where a 22 kΩ (red-red-orange) resistor is called for. A resistor that is discolored, or cracked, or shows any sign of bulging would indicate that it is damaged and should be replaced. Since damaged resistors are often the result of some other difficulty (such as faulty wiring), you should try to find out what caused the damage before you replace the part.
9. Be sure the correct diode is installed at each diode location, and that the banded end is positioned correctly.
10. Check all component leads connected to the circuit boards. Make sure the leads do not extend through the circuit board and come in contact with other connections or parts.

If you still cannot locate and correct the trouble after the above tests are completed, and if a voltmeter is available, check your Clock's voltages against the voltages shown on the Schematic Diagram (fold-out from Page 31) and in the "Circuit Board Voltage Charts" (Page 30).

NOTE: In an extreme case where you are unable to resolve a difficulty, refer to the "Service" section of the "Kit Builders Guide" and to the "Factory Repair Service" information on Page 25 of this Manual. Your Warranty is located inside the front cover of this Manual.

WARNING: Hazardous voltages are exposed in the Clock when the cabinet top is removed and the line cord is plugged into the AC outlet. See "Chassis Photograph" on Page 27.



PICTORIAL 5-2

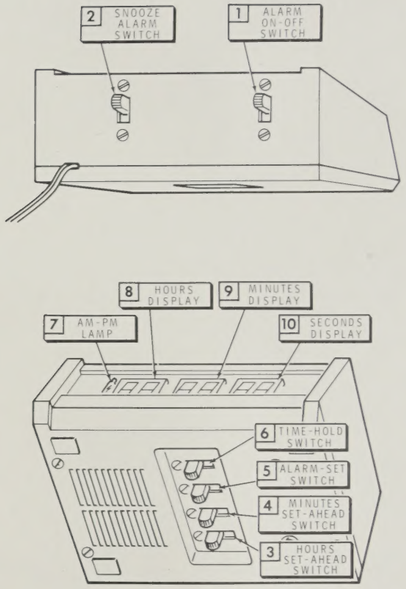
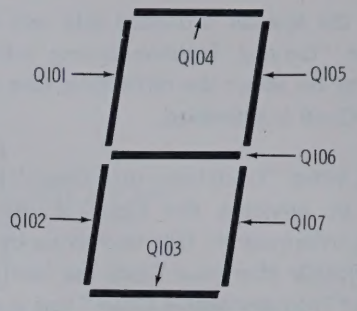


Figure 2

Troubleshooting Chart

This chart lists the condition and possible cause of several malfunctions. If a particular part or parts are mentioned (Q107 for example) as a possible cause, check that part to see that it was installed and/or wired correctly. It is also possible, on rare occasions, for a part to be faulty and require replacement.



CONDITION	POSSIBLE CAUSE
A digit or a segment of digit does not light.	1. Check pins of that display tube.
The same segment of all six digits remains lit or does not turn on.	1. Associated transistor (Q101 through Q107). See above.
One digit does not light.	1. Associated transistors (Q201 through Q212) as follows: V101B – Q211, Q212. V101A – Q209, Q210. V102B – Q207, Q208. V102A – Q205, Q206. V103B – Q203, Q204. V103A – Q201, Q202.
None of the digits light.	1. Diode D201. 2. Fuse F301.
One digit lights up much brighter than others.	1. Associated transistor (Q201 through Q212).
Only one digit is turned on.	1. IC201.
Time or alarm cannot be set.	1. Diodes D204 through D211. 2. Switch S301 through S306.
Time does not advance.	1. Diode D203. 2. IC201.
Alarm does not work properly.	1. Switch S305 or S306. 2. Diode D208 or D209. 3. Transistor Q214. 4. Speaker SP301.
AM-PM lamp does not turn on.	1. Switch S301 or S302. 2. Transistor Q213.

FACTORY REPAIR SERVICE

You can return your completed kit to the Heath Company Service Department to have it repaired for a minimum service fee. (Kits that have been modified will not be accepted for repair.) Or, if you wish, you can deliver your kit to a nearby Heathkit Electronic Center. These centers are listed in your Heathkit catalog.

To be eligible for replacement parts under the terms of the warranty, equipment returned for factory repair service, or delivered to a Heathkit Electronic Center, must be accompanied by the invoice or the sales slip, or a copy of either. If you send the original invoice or sales slip, it will be returned to you.

If it is not convenient to deliver your kit to a Heathkit Electronic Center, please ship it to the factory at Benton Harbor, Michigan and observe the following shipping instructions:

Prepare a letter in duplicate, containing the following information:

- Your name and return address.
- Date of purchase.
- A brief description of the difficulty.
- The invoice or sales slip, or a copy of either.
- Your authorization to ship the repaired unit back to you C.O.D. for the service and shipping charges, plus the cost of parts not covered by the warranty.

Attach the envelope containing one copy of this letter directly to the unit before packaging, so that we do not overlook this important information. Send the second copy of the letter by separate mail to Heath Company, Attention: Service Department, Benton Harbor, Michigan 49022.

Check the equipment to see that all parts and screws are in place. Then, wrap the equipment in heavy paper. Place the equipment in a strong carton, and put at least THREE INCHES of resilient packing material (shredded paper, excelsior, etc.) on all sides, between the equipment and the carton. Seal the carton with gummed paper tape, and tie it with a strong cord. Ship it by prepaid express, United Parcel Service, or insured parcel post to:

Heath Company
Service Department
Benton Harbor, Michigan 49022

SPECIFICATIONS

Display	Six full digits.
Format	12 or 24 hour.
Accuracy	Determined by accuracy of power line frequency.
Snooze Alarm	Seven minute intervals.
Power	6.5 watts, 120 VAC or 240 VAC, 50 Hz or 60 Hz.
Dimensions	7" wide x 5" deep x 2-1/2" high.
Weight	3 lbs.

The Heath Company reserves the right to discontinue instruments and to change specifications at any time without incurring any obligation to incorporate new features in instruments previously sold.

CIRCUIT FUNDAMENTALS

The following fundamentals will give you a better understanding of the circuit relationships in your Clock and describe how the circuits work together. Refer to the Schematic Diagram (fold-out from Page 31) while you read the following information.

All the digital logic is performed inside of IC201. The remaining circuitry supplies the DC power and responds to the commands from IC201 to drive the speaker and the display tubes.

Resistor R204 and capacitor C201 are the timing components for the oscillator inside IC201. The oscillator scans (applies a positive driving pulse to first D1, then D2, then D3, etc.) outputs D1 through D6 in rapid succession. At the correct times, positive pulses are applied to the proper pins (9 through 15) of IC201 to turn on the correct digits in the proper display tubes.

Example: Consider the time 08:56:21.

As a positive pulse is applied to D1 (which turns on transistors Q201 and Q202, and applies 230 volts to the anode of tube V103, part A), positive pulses are also applied to pins 13 and 14 of the IC. These pulses at pins 13 and 14 turn on transistors Q105 and Q107, which turn on segments b and c of the display tube, and a one is displayed. The other digits (of V203, V202, and V201) do not light up because they do not have a high enough voltage at their anodes.

The positive pulse is then applied to D2, and part B of tube V103 receives the high anode voltage. At this same time, positive pulses are also applied to pins 9, 11, 12, 14, and 15 of the IC. This turns on segments a, b, g, e, and d, and a two is displayed.

Next, positive pulses are applied to D3 and pins 9, 10, 11, 12, 13, and 15 of the IC, and a six is displayed in part A of V102. The scanning continues through D6 and then starts over. This happens so fast that all six digits appear to be on at once.

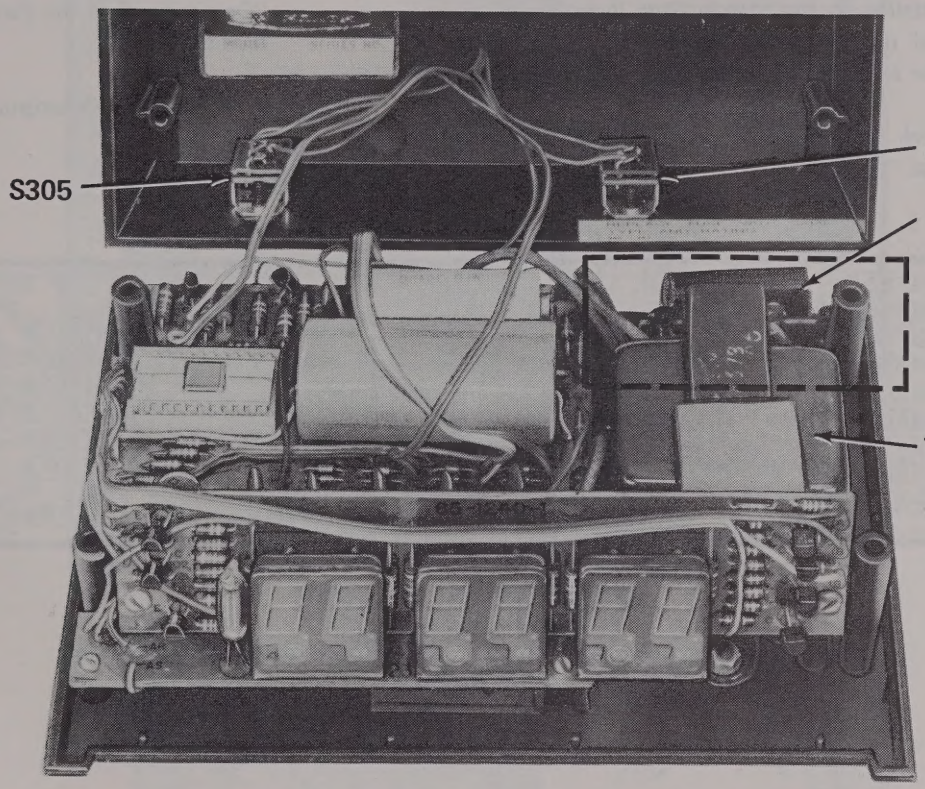
Transistor Q213 turns on lamp V201 at the proper time when the alarm or time is being set, and transistor Q214 drives the speaker, SP301.

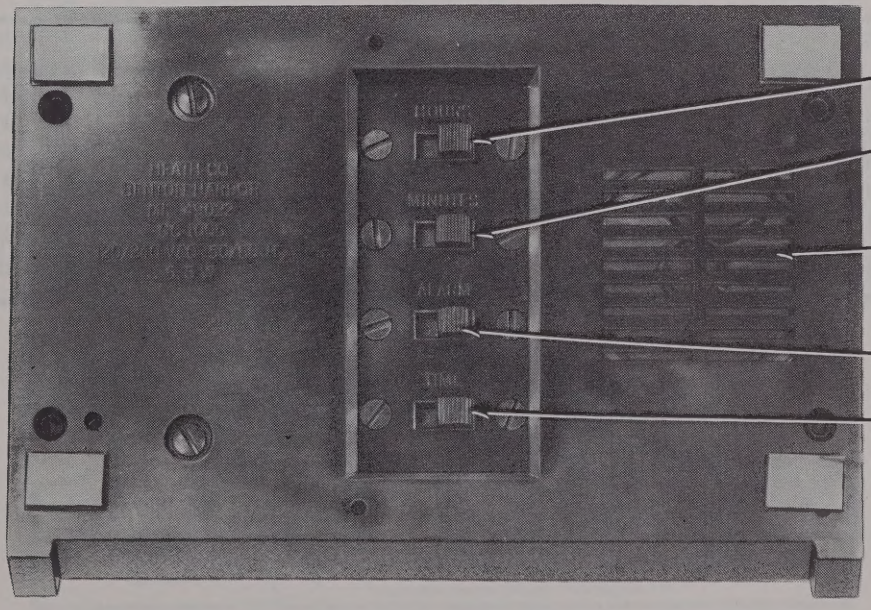
Diodes D204 through D211 are a diode matrix to keep the DC voltages on their own control lines. (D1 through D6 are the control lines.)

Dual-primary transformer T301 can be wired to operate from either 120 VAC or 240 VAC. Two secondary windings furnish the voltage required by the Clock. Diode D201 forms a half-wave rectifier, and capacitor C203 and resistor R211 filter this voltage that drives the display tubes. Diode D202, resistor R210, and capacitor C204 also are a rectifier and filter circuit, and zener diode ZD201 maintains the proper operating voltage for IC201. Diode D203 is another rectifier and, along with resistors R209 and R208, provides the proper 50 or 60 Hz signal to act as the Clock's reference frequency. Capacitor C202 is a filter capacitor.

CHASSIS PHOTOGRAPH

WARNING: Boxed in area indicates hazardous voltage location.





CIRCUIT BOARD X-RAY VIEWS

NOTE: To identify a part shown in one of these Views, so you can order a replacement, proceed in either of the following ways:

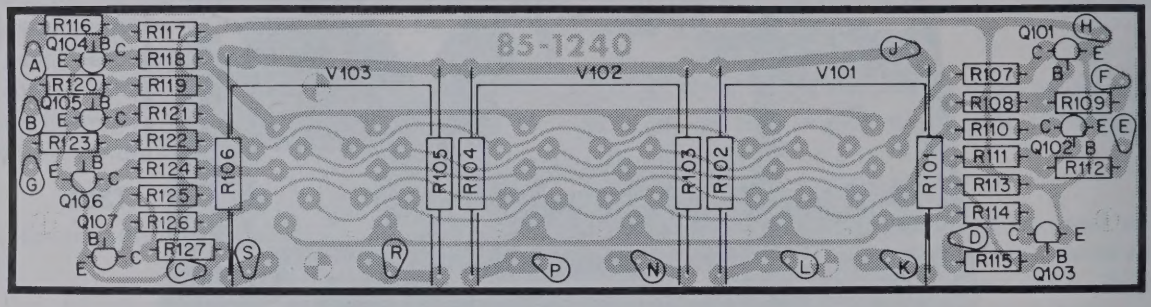
1. A. Refer to the place where the part is installed in the Step-by-Step instructions and note the "Description" of the part (for example: 22 kΩ, .05 μF, or 2N2712).

   B. Look up this Description in the "Parts List."

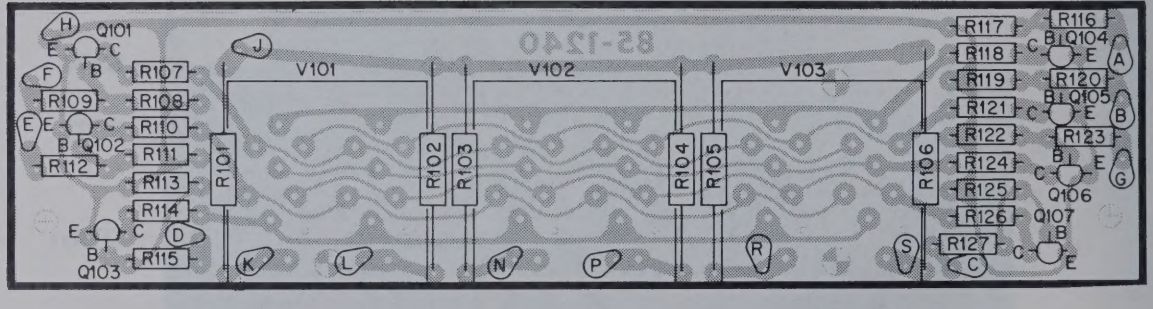
2. A. Note the identification number of the part (R-number, C-number, etc.).

   B. Locate the same identification number (next to the part) on the Schematic. The "Description" of the part will also appear near the part.

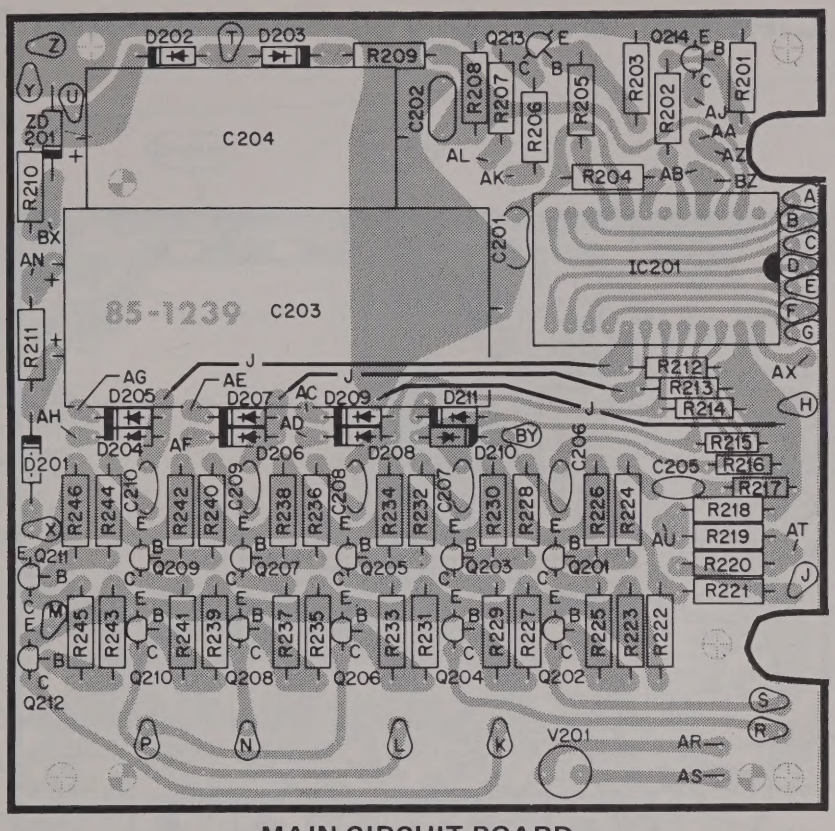
   C. Look up this Description in the "Parts List."



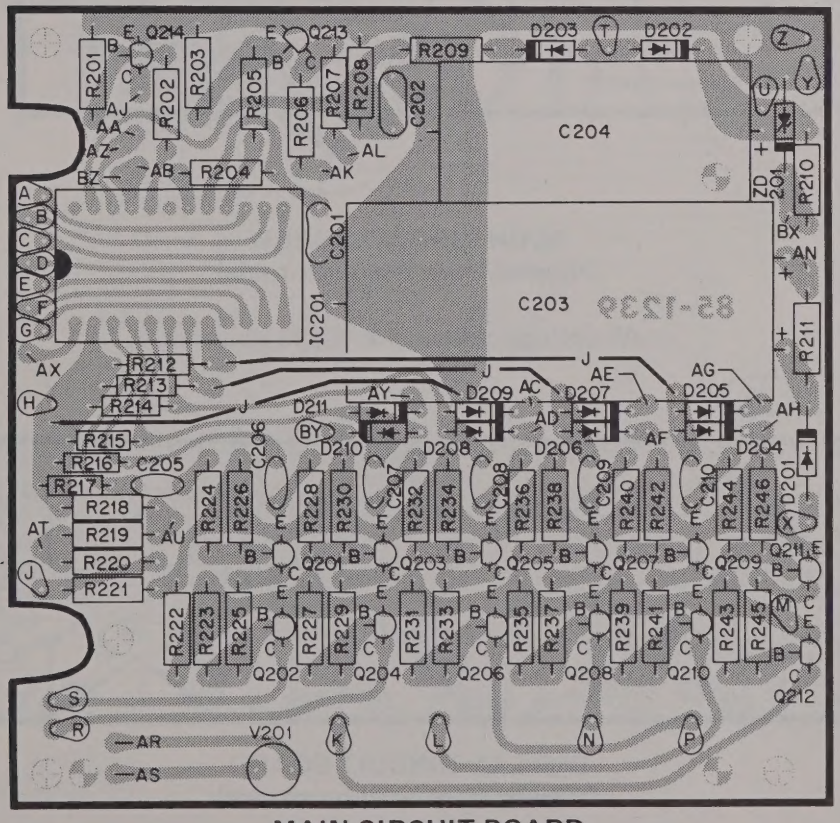
DISPLAY CIRCUIT BOARD
(Viewed from foil side)



DISPLAY CIRCUIT BOARD
(Viewed from component side)

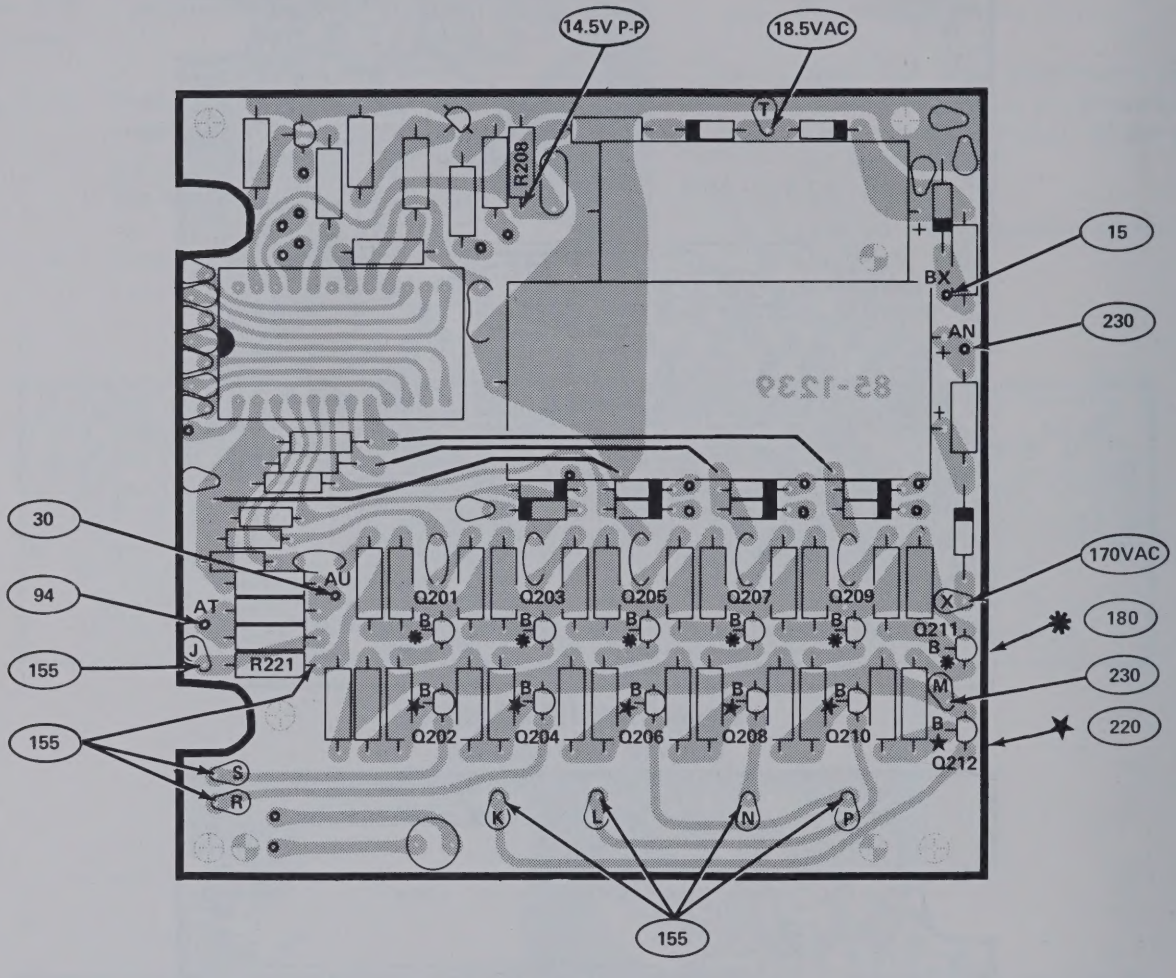


MAIN CIRCUIT BOARD
(Viewed from foil side)



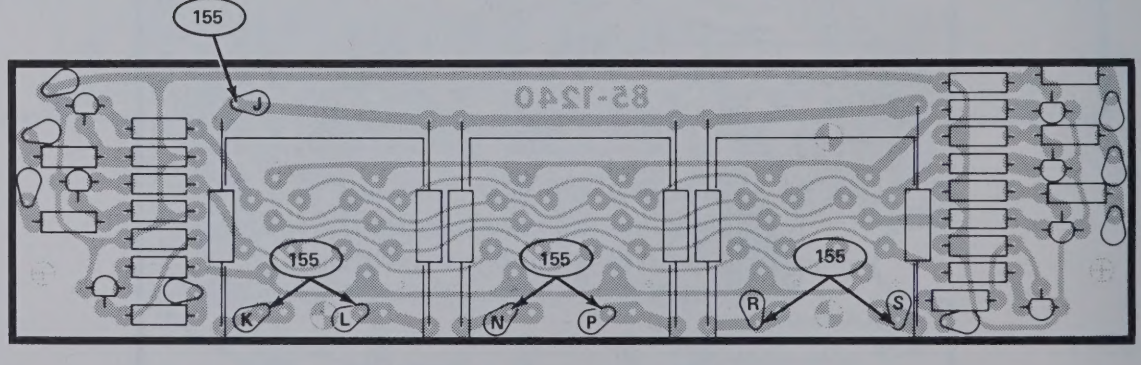
MAIN CIRCUIT BOARD
(Viewed from component side)

CIRCUIT BOARD VOLTAGE CHARTS

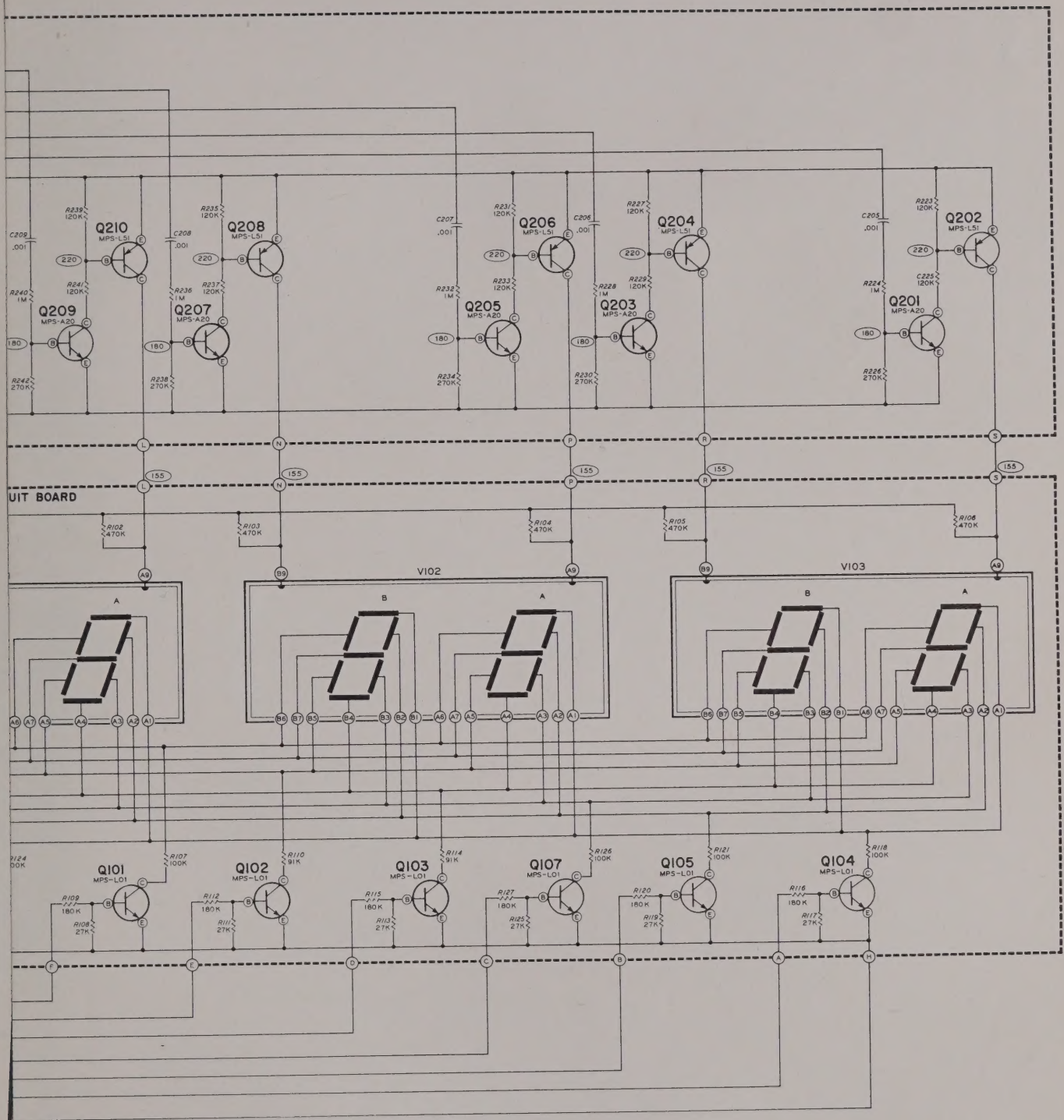


MAIN CIRCUIT BOARD
(Viewed from component side)

All voltages taken with IC201 removed.



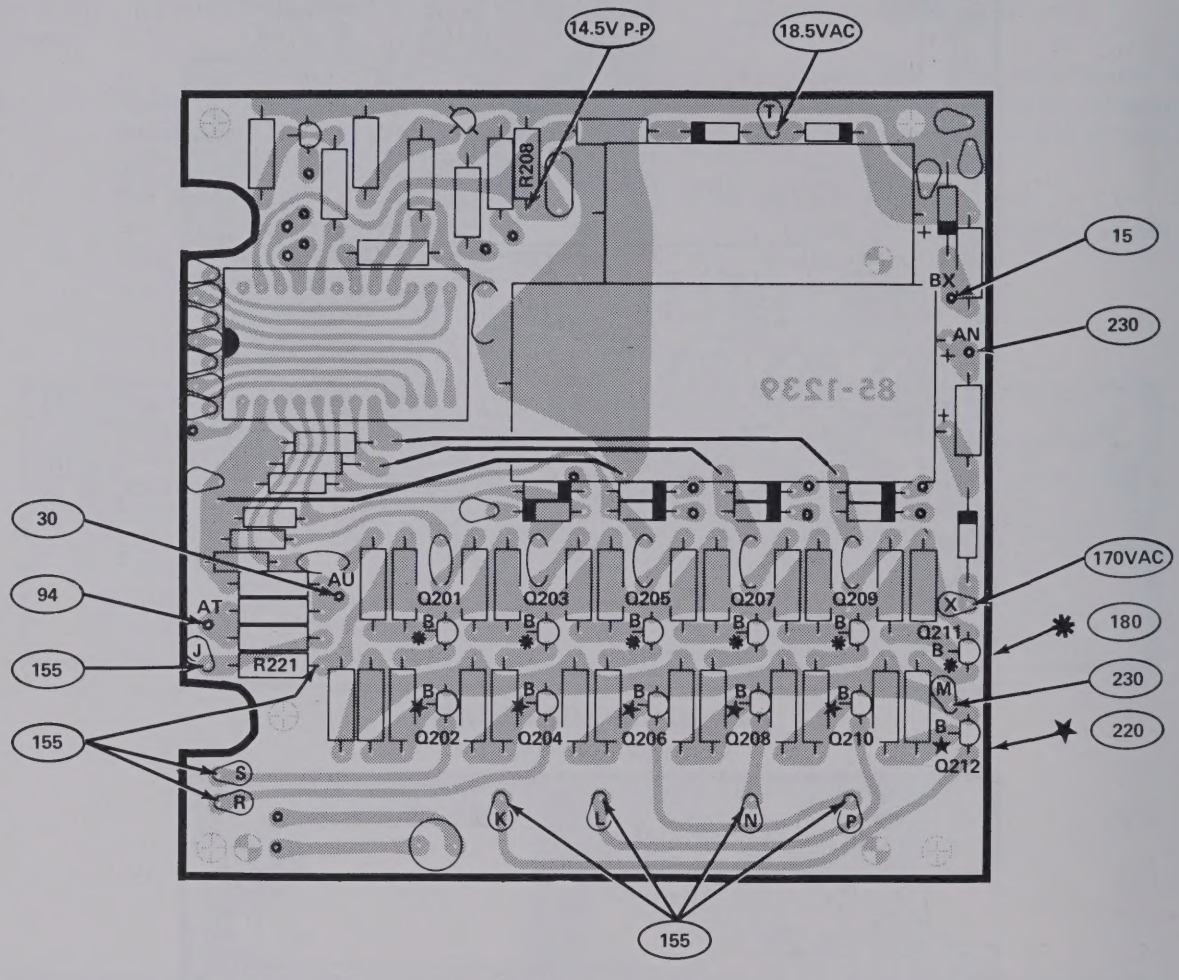
DISPLAY CIRCUIT BOARD
(Viewed from component side)



INDICATES A LETTERED CIRCUIT BOARD

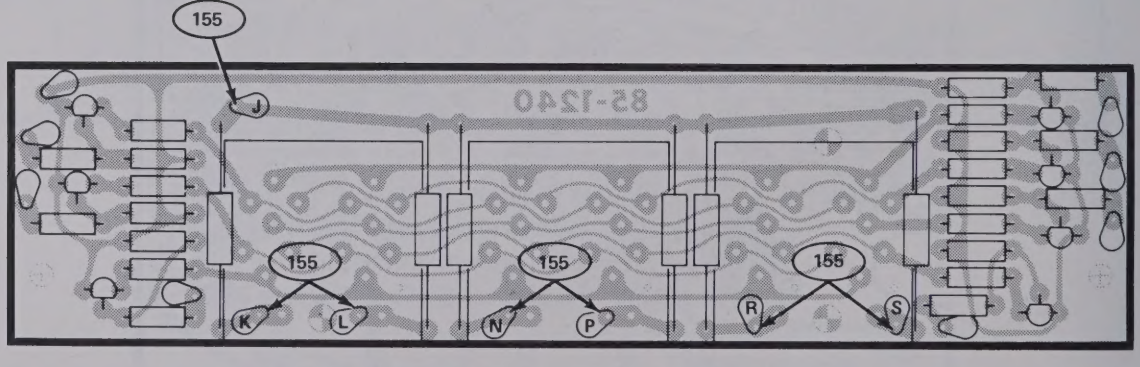
INDICATES A DC VOLTAGE MEASURED WITH
IMPEDANCE VOLTMETER FROM THE POINT
GROUND. VOLTAGES MAY VARY ±10% AND
TH IC201 REMOVED.

CIRCUIT BOARD VOLTAGE CHARTS



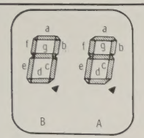
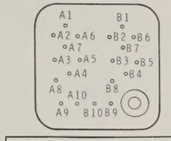
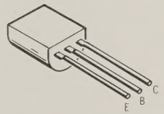
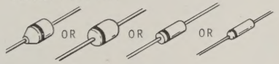
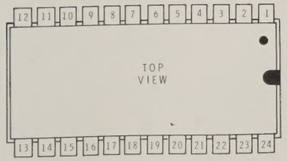
MAIN CIRCUIT BOARD
(Viewed from component side)

All voltages taken with IC201 removed.

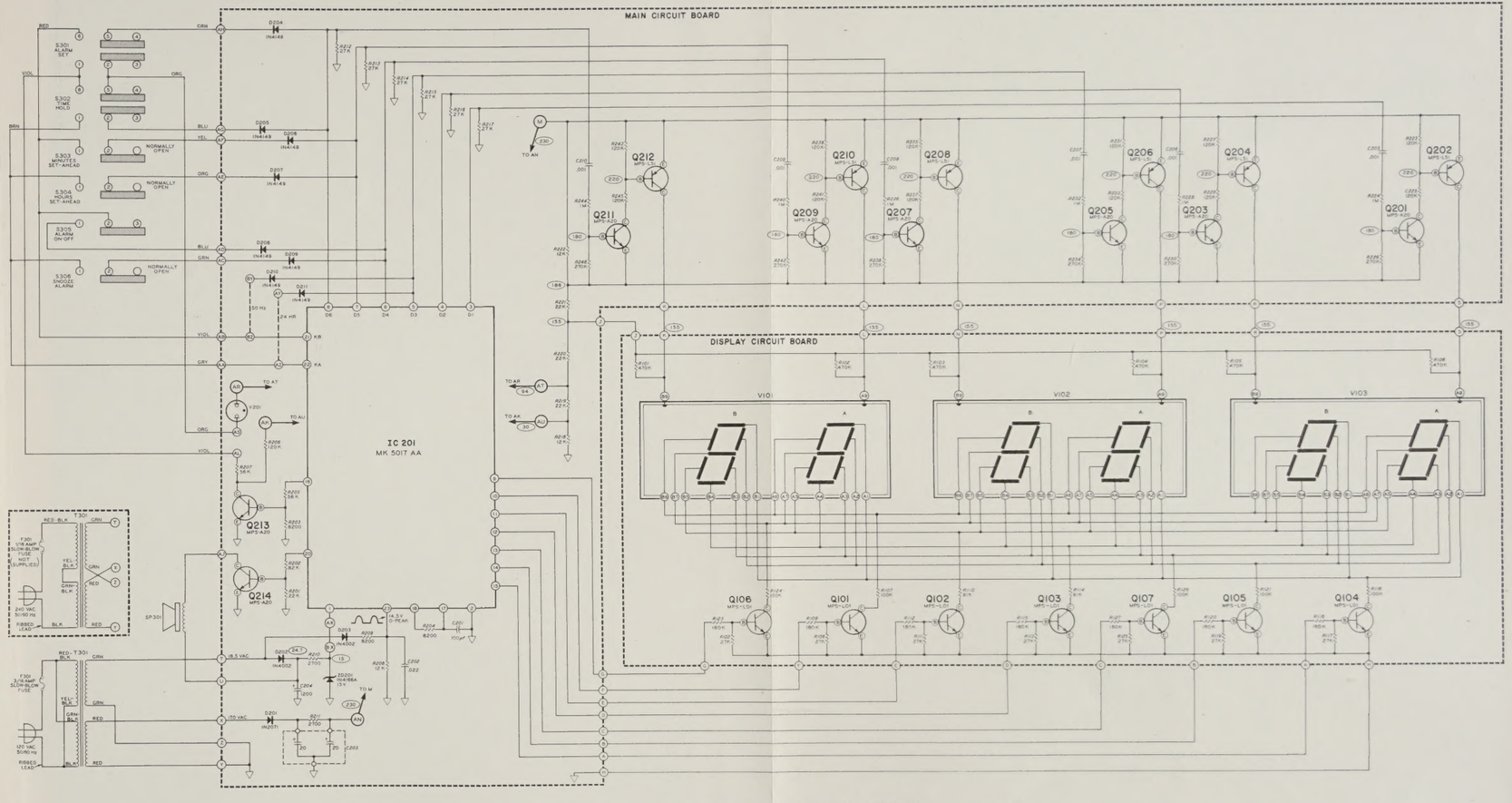


DISPLAY CIRCUIT BOARD
(Viewed from component side)

IDENTIFICATION CHART

COMPONENT	HEATH PART NUMBER	MAY BE REPLACED WITH	IDENTIFICATION
V101, V102, V103	411-286	SPERRY RAND SP-352	 VIEWED FROM FRONT  VIEWED FROM BACK
Q201, Q203, Q205, Q207, Q209, Q211, Q213, Q214	417-801	MPS-A20	
Q202, Q204, Q206, Q208, Q210, Q212	417-295	MPS-L51	
Q101-Q107	417-811	MPS-L01	
ZD201	56-25	1N4166A ZENER DIODE, 15V, 17 mA	NOTE: HEATH PART NUMBERS ARE STAMPED ON MOST DIODES. 
D204-D211	56-56	1N4149 SILICON DIODE, 75V, 10mA.	
D201	57-27	1N2071 SILICON DIODE, 600V, 1A	
D202, D203	57-65	1N4002 SILICON DIODE, 100V, 1A.	
IC201	443-601	MK5017AA	

SEGMENT	PIN NUMBER
a	1
b	2
c	3
d	4
e	5
f	6
g	7
DECIMAL	8 (NOT USED)
ANODE	9
	10 (NOT USED)



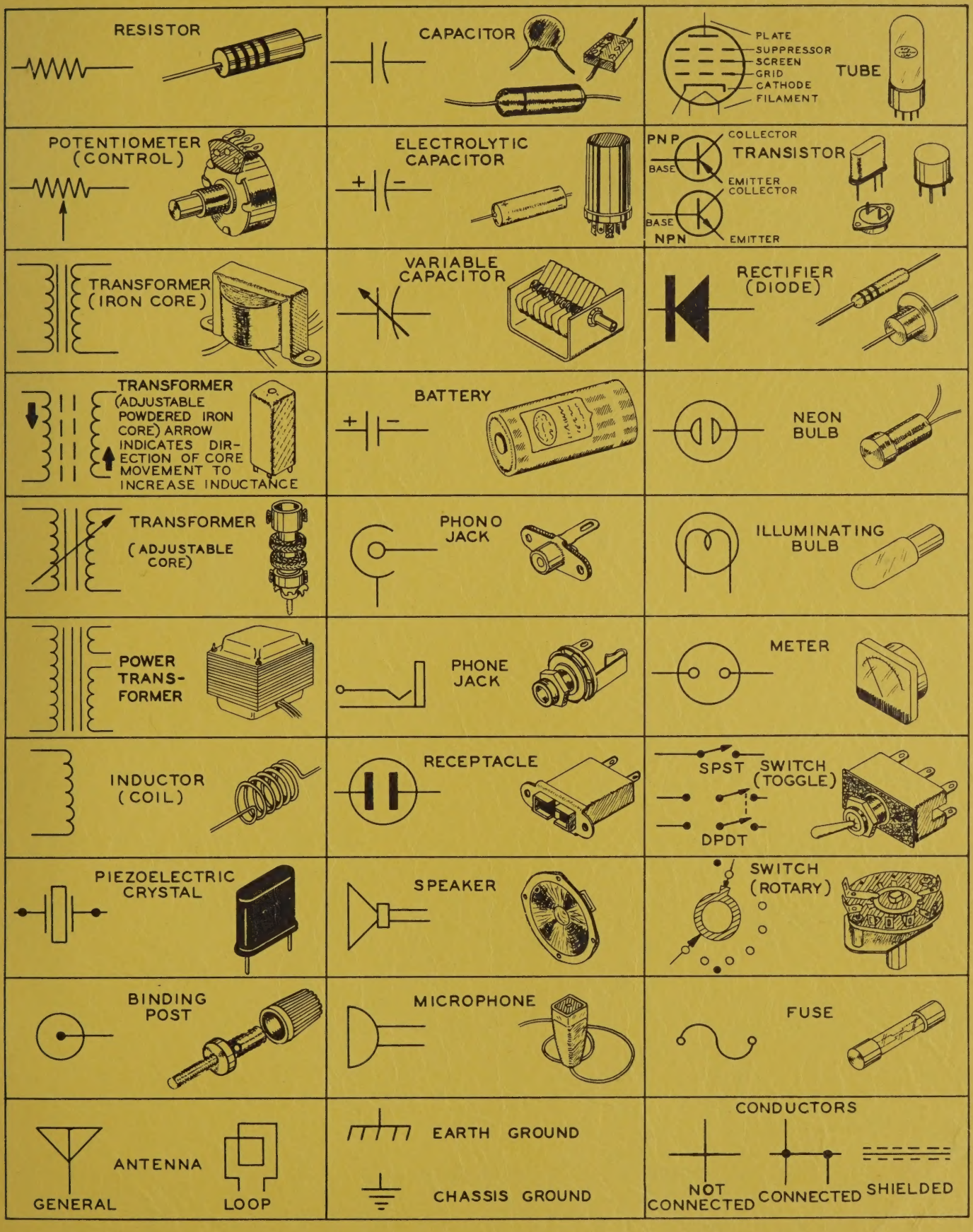
SCHEMATIC OF THE HEATHKIT® ELECTRONIC CLOCK MODEL GC-1005

NOTES

1. ALL RESISTOR VALUES ARE IN OHMS. K=1000, M=1,000,000.
2. ALL CAPACITOR VALUES ARE IN μF UNLESS MARKED OTHERWISE.
3. ▽ THIS SYMBOL INDICATES A CIRCUIT BOARD GROUND.
4. ○ THIS SYMBOL INDICATES A LETTERED CIRCUIT BOARD CONNECTION.
5. ⬭ THIS SYMBOL INDICATES A DC VOLTAGE MEASURED WITH A HIGH INPUT IMPEDANCE VOLTMETER FROM THE POINT INDICATED TO GROUND. VOLTAGES MAY VARY ±10% AND ARE TAKEN WITH IC201 REMOVED.

TYPICAL COMPONENT TYPES

This chart is a guide to commonly used types of electronic components. The symbols and related illustrations should prove helpful in identifying most parts and reading the schematic diagrams.



HEATH

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